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INJURY REPORTING AND INFORMATION SYSTEM FIELD TEST. VOLUME II. TABULATION OF DATA

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16. Abstracts This report contains information gathered as a by-product of the field test for the Injury Reporting and Information System. Although absolute for the eleven public and four private participants, conclusions do not necessarily apply to the solid waste management industry as a whole. The need for IRIS arises from the extremely high incidence and severity rates for injuries associated with this industry, and from the fact that no data are at present available which can be used to set priorities for injury reduction programs or to monitor their success. The purpose of the field test was to design a workable injury reporting and analysis system. Data supplied by the participants to the Central Data Office was collated and returned in a Quarterly Safety Management Report to each participant identified by code. This type of comparison, made possible through the use of man-hours of exposure for various activities, serves two purposes. The first is to identify the agencies with the lowest incidence rates so they may be studied to gain insight into the solutions of problems for others; the second is to monitor the success of implemented countermeasures.

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Volume I describes a field test of an injury reporting and analysis system for the solid waste management industry.

Volume II contains the tabulation of data.

U.S. ENVIRONMENTAL PROTECTION AGENCY

1975

INJURY REPORTING AND INFORMATION SYSTEM (IRIS) FIELD TEST

VOLUME II: TABULATION OF DATA

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I. INTRODUCTION

This Tabulation of Data is submitted in conjunction with the Final Report on Contract 68-03-0231, "Field Test of an Injury Reporting and Analysis System for the Solid Waste Management Industry," and contains information relating to injury rates in this industry. This information was produced as a by-product of the Field Test as described in the Final Report. The primary objective of the Field Test was to develop and test the elements of a system which would yield analyzed data that could be used:

(a) by line management of solid waste agencies, to identify, set priorities for, and evaluate injury reduction programs;

(b) to motivate line management of solid waste agencies to assign a high priority to injury reduction programs in general;

(c) by national groups responsible for setting standards for equipment and work practices in the solid waste management industry; and

(d) by the Office of Solid Waste Management Programs, U.S. Environmental Protection Agency, to set priorities for and monitor programs of injury control as related to productivity and work practices.

The analysis of data performed during the Field Test was primarily directed towards testing whether data could be collected and analyzed to give information of the types desired, and towards developing the methods and procedures that could be used in a later larger scale prospective study of injuries in this industry.

However, it did prove possible to produce a limited amount of analyzed data that is of some interest, and is thus presented in this volume. The data is limited both in scale (approximately 1,500 injuries in all, occurring to approximately 3,000 employees of 15 solid waste management agencies) and in the range of analyses presented. A large number of factors were recorded concerning each employee, each injury, and various equipment characteristics and work practices. It was not possible to produce analyses of the relationship of each factor to injury rate, still less each combination of factors. Rather, a selection was made of which analyses to perform. The choice of type of analysis is an important part of the use of this type of data, and the study of which analyses are most useful is still proceeding.

An important objective of the injury reporting and analysis system is to be able to make valid comparisons and thus to be able to observe <u>differences</u> in injury experience. These differences are of great importance. If one solid waste agency has an injury rate that is much lower than another, in a specific area where valid comparisons can be made, then it is immediately apparent that progress <u>is</u> possible. In order to observe these differences, the injury reporting and analysis system developed in the Field Test has several novel features. Two of the most important are that the work environment is broken down into various aspects applicable to this specific industry, and that the exposure of employees to these aspects is quantitatively estimated.

Breaking down the work environment into aspects overcomes some of the serious limitations of the conventional method of collecting and analyzing injury statistics. In the conventional method, injury data is usually collected for an entire establishment (work place) and covers some large and loosely defined group of employees. The overall injury rate for this group is then calculated, in terms of injuries per 200,000 man-hours or some other standard, and a limited number of breakdowns of the injury experience are given, usually in terms of factors applicable to all industries, e.g., accident type--fall to same level or fall to different level. This type of data collection and presentation has two weaknesses. One is that it is difficult to compare the injury experience of different solid waste agencies, since the type of work performed and the nature of the work force differ from one agency to another. This leads to the very serious consequence that the power of injury statistics to motivate action to reduce injuries is greatly reduced. It was found in a Pilot Study, performed before the Field Test and referred to in the Final Report, that most managements of solid waste agencies with injury rates far higher than average believed that their injury experience was normal for the industry, or, when pressed, stated that the high injury rate was due to the special nature of their work, climate, employees or other circumstances. The second weakness of the conventional method of data collection and presentation is that it does not break down the work environment

and the injury experience in a way that can be used to identify areas that need attention or to document the likely benefits of injury reduction programs. A suitable choice of the aspects into which the work environment is broken down can help remedy both weaknesses. For example, one aspect used is the concept of activity. By activity is meant the specific operation or task being performed by the injured employee at the time he was injured. By breaking down the workday into activities, the injury rate can be compared for each activity, so that the relative hazards of each activity can be examined and priorities can be set for injury reduction programs. In addition, by the breakdown into activities it is possible to realistically compare the injury experience of different participants by comparing the injury rates associated with performing exactly the same task.

Exposure data is required in order to realistically compare the various aspects of the work environment. Exposure data, also referred to in the Final Report as basing data, means the man-hours or equipment-hours at risk for various activities. For example, it is not enough to know what fraction of injuries happen to workers while carrying refuse containers. It is also necessary to know how many man-hours are spent carrying refuse containers. The injury risk (injury rate per man-hour) can then be computed and used, for example, to compare the injury experience of different solid waste agencies for workers performing this same task.

In order to collect exposure data it is necessary to collect data on all employees, whether injured or not.

The methods developed for collecting both injury and exposure data are discussed in detail in the Final Report. An example of the procedure used to compute the injury risk associated with an employee characteristic, height over 6 feet, is given on page 68 of the Final Report.

Cost data was also collected and included in the analysis, since knowledge of the cost associated with injuries is required to motivate management and to justify injury reduction programs such as modifications to equipment, work practices or protective clothing.

The 15 participants in the Field Test were selected, using the procedures described in the Final Report, to cover a range of geographical locations, number of employees, ownership, collection methods, services provided, etc., shown in EXHIBIT 1.

Analyses were performed using programs written in ANSI-COBOL. Printouts of analyzed data were in one of two general formats, a single factor analysis and a "profile," as discussed in the Final Report.

II. OVERALL DIMENSIONS OF THE INJURY PROBLEM

By pooling the injury experience of the participants in the Field Test it is possible to see some of the dimensions of the injury problem in the solid waste management industry, at least for the limited sample (approximately 3,000 employees) covered by the Field Test.

- The OSHA injury incidence rate was 39. This means that about 4 out of 10 employees are being injured per year (not including first aid injuries). It is interesting to compare this rate with the OSHA incidence rates reported in the Bureau of Labor Statistics (BLS) 1972 Survey of Occupational Illnesses and Injuries. In the BLS report, the average for all industry is 10.9, and the two highest rates for industries are for malleable iron foundries (42.1) and logging camps and logging contractors (32.5). For the participants in the Field Test, at least, it appears that the solid waste management industry is maintaining its position as one of the industries with the highest injury rates. The BLS survey did not cover the solid waste management industry, so that no direct comparisons between Field Test data and BLS data for this industry were possible.

- The incidence of lost workday cases was 26.7. This means that nearly 3 out of 10 employees will each year suffer an injury involving lost workdays. The highest such figure listed in the 1972 BLS report referred to above is 16.2, for logging camps and logging contractors.

- 11.1 workdays were lost, on the average, for each lost workday case.

- The average employee lost three days from work per year due to injury.

- 66% of the OSHA recordable injuries resulted in lost workdays. This proportion is about twice that for the average manufacturing industry (i.e.,

proportionately more of the injuries in solid waste management involve lost workdays, and proportionately fewer involve only medical treatment).

- Of the 962 OSHA recordable injuries reported during the Field Test, 23 resulted in permanent disability, and one in death. If this proportion of permanently disabling injuries is typical of the industry as a whole, the average employee, during a working life assumed to be 25 years, would have a 23% chance of being permanently disabled to some degree (taking OSHA incidence rate = 0.39 per year x (fraction of OSHA injuries that are disabling = 0.024) x 25 years).

- A similar computation using the data from EXHIBIT 3 shows that the average employee of the Field Test participants has a 9% chance of suffering an amputation during a 25 year work life.

- The 1,342 total injuries (of which 962 were OSHA recordable and 380 first aid) had a reported direct cost (including only wage continuation, medical payments, death and disability benefits, etc. and no indirect costs) of $590,600, for an average direct cost per injury (including first aid injuries) of $440.

- The average direct cost of injuries was $240 per year for each person on the payroll (i.e., all employees, whether injured or not).

- The ANSI frequency rate was 133.5. This may be compared with National Safety Council (NSC) data, which uses the ANSI system. The frequency rates for 1973 (taken from NSC's publication "Work Injury Rates 1974") were 104 for refuse collection and 72 for refuse disposal. The reported injury frequency experience of the Field Test sample is thus somewhat worse than for the NSC sample (which covers only a self-selected fraction of the industry).

- The ANSI severity rate was 5,375. This may be compared with the NSC data for 1973: 2,529 for refuse collection and 8,072 for refuse disposal. ANSI severity rates are greatly influenced by events such as deaths for which time charges are made.

III. DEPENDENCE OF INJURY RATE ON SELECTED FACTORS

A number of simplified tables have been prepared from the printouts obtained during the Field Test. These tables show the dependence of injury rate, severity and cost on various factors, selected from the range of factors studied during the Field Test.

For each such factor, the table lists the categories within that factor, e.g., the category head within the factor part of body. For each category, the following items are listed:

(a) The number of OSHA recordable injuries for that category, and either

(i) the percentage of the total number of injuries for all categories, or

(ii) the injury rate, expressed as number of OSHA recordable injuries per 200,000 man-hours at risk.

For factors in which all categories are exposed to the same risk, the percentage (i) is shown in the table. This is the case for factors such as part of body because each employee is at risk to injure any part of his body. For other factors, the rate (ii) is shown in the table. For these factors, the number of man-hours at risk is not the same for each category and it is necessary to use rates to make valid comparisons. For example, the different categories of the factor employee age have different man-hours at risk because there are more workers in the age group 26-35 than there are in the age group 55-65. To compare the number of injuries in the two groups it is necessary to allow for the difference in the number of workers at risk: this is done by using the rates.

The categories are listed in order of percentage or rate, and indicate the frequency of injuries in each category.

(b) The number of workdays lost for that category; the percentage or rate (number of workdays lost per 200,000 man-hours at risk) as for (a); and the average number of lost workdays lost per lost workday case.

The categories are listed in order of percentage or rate, and the three values give a measure of the severity of injuries in each category.

(c) The total direct costs for injuries in that category; a percentage or rate as in (a) (here the rate is the average direct cost per man-year at risk); and the average direct cost per injury.

The direct costs include only wage continuation payments to the employee (by insurance carrier or employer), medical payments, and death and disability benefits. No indirect costs or insurance premiums are included.

The categories are listed in order of percentage or rate. The direct costs give a measure of the importance, on a cost basis, of injuries in each category.

The tables generally represent data from all 15 participants for a 12 month period from September 1973 to August 1974. Some tables are for fewer participants or a shorter period, e.g., omitting one participant that did not provide complete cost data, or using a 10 month period in which 13 participants were contributing data simultaneously. The total number of injuries is thus not always the same for each table. In addition, some tables only include a fraction of the work force, e.g., the table for collection crew size only includes employees engaged in refuse collection.

3.1 General Description of Injury

EXHIBIT 2 shows the breakdown of injuries by accident type. This is for the type of first accident, if there is a two stage

accident, such as a fall followed by the employee striking his head on the ground (which would be classified as a fall rather than a struck against).

Overexertion accidents contributed about 20% of the number of injuries, days lost and direct costs. Some accident types, such as struck by vehicle were uncommon (approximately 3% of injuries) but contributed 6% of the days lost and 14% of the direct costs. Others, such as struck against vehicle and foreign object in eye were more frequent but contributed less importantly to days lost and direct cost. It is apparent that all three measures of importance (frequency, days lost, and direct cost) are necessary to evaluate the overall significance of any one category of injuries, since there are significant differences in the order in which the categories appear in each part of the table.

Many of these categories, e.g., fall to same level or step on sharp object become of greatest importance only when comparisons are made between different participants, as discussed in Section IV.

EXHIBIT 3 shows a breakdown by injury description. Amputations and fractures were relatively rare (1% and 2% of injuries respectively) but contributed 11 and 12% of the days lost and 10 and 11% of the total direct costs. The frequency of amputations found in the Field Test (9 out of 953 OSHA recordable injuries) would, if applicable to the industry as a whole, lead to the conclusion that the average solid waste worker has a 9% chance of suffering an amputation over a 25 year working span.

EXHIBIT 4 shows a breakdown by part of body. It is interesting to note that toe injuries were relatively rare (1%) but contributed 13% of the days lost and 15% of the total direct cost. Special attention to toe injuries would appear to be justified. Back injuries contributed about 20% of the days lost and costs.

3.2 Factors Associated with Time, Day and Season

EXHIBIT 5 shows a breakdown by day of week. The rates for OSHA recordable injuries and workdays lost are also shown in graphical form in EXHIBIT 6. The number of injuries per man-hour worked was highest on Monday, fell in mid week and then rose again on Friday and Saturday. The rate for lost workdays shows a similar pattern, with the number of workdays lost being lower on Monday, and higher on Friday and Saturday than might be expected simply from the number of injuries on those days.

A breakdown by the number of hours worked that day prior to injury is shown in graphical form in EXHIBIT 7 and, as a table, in EXHIBIT 8. "One hour" means up to one hour from the starting time, "two hours" up to two hours, and so on. The injury rate was roughly constant up to 5 hours. The later fall and subsequent rise is probably associated with different groups of employees remaining at risk, with the first hours including "task" employees (who generally work 5-6 hours per day and have a high injury rate) and the later hours including fewer of these employees. The graph for the workdays lost rate shows that both

the first hour and the sixth hour experienced a number of workdays lost that was substantially higher than would be expected simply from the number of injuries during these hours.

The injury data were also analyzed by hour of day of occurrence, but did not show clear trends owing to a mixture of different groups of employees with different working hours.

3.3 Employee Characteristics

EXHIBIT 9 shows a breakdown by employee age at time of injury. The rates for OSHA recordable injuries and workdays lost are also shown in graph form in EXHIBIT 10. The rate for number of injuries fell, but the rate for workdays lost remained approximately steady with increasing age, owing largely to an increase in the average number of workdays lost per lost workday case as employee age increased.

EXHIBIT 11 shows a graph of the rates for OSHA recordable injuries as a function of education of the employee, with corresponding information in tabular form in EXHIBIT 12. The injury rate did not show a systematic variation with years of education.

EXHIBIT 13 shows a breakdown by employee height, with a corresponding graph in EXHIBIT 14. There was an apparent increase in injury rate with height but the rate for workdays lost showed no systematic variation with height for those categories where there were enough injuries to smooth out statistical fluctuations.

EXHIBIT 15 shows a graph of the rates for OSHA recordable injuries as a function of employee weight, with corresponding information in tabular form in EXHIBIT 16. The variation of injury rate with employee weight found in the Field Test does not at present justify imposing weight restrictions at the time of hire, based purely upon expected injury rates.

EXHIBIT 17 gives a breakdown by basis of employment. Temporary workers appeared to have a significantly higher rate for number of OSHA recordable injuries than regular workers, but a lower rate for workdays lost, possibly representing the effect of improved injury leave benefits for regular workers.

3.4 Factors Related to the Work Environment

EXHIBIT 18 gives a breakdown by occupational group. These represent the grouping together of occupational categories which, separately, did not have enough injuries to be significant. EXHIBIT 19 gives a breakdown by division of employment (Collection division, streets division, etc.). EXHIBIT 20 gives a breakdown by location of injury (e.g., whether the injury occurred at the landfill, on the collection route, etc.).

These three exhibits represent different ways of breaking down the injury experience of a solid waste agency so as to make injury rates more comparable between agencies. The use of occupational group (e.g., collection crews) enables comparisons to be made between agencies with a different mix of employees

and also enables the risk to different occupational groups to be compared. Collection crews had, as expected, the highest risk of injury. In the more detailed breakdown by occupation, from which these occupational groups were assembled, a comparison was made between employees who drive and collect refuse, and those who only collect refuse. The former had a lower injury rate (48 vs 53), and a lower rate for lost workdays (390 vs 376).

The breakdown by division shows that employees of landfill divisions had lower rates for OSHA recordable injuries and days lost than employees of collection divisions. The results for location in EXHIBIT 20 show, however, that working at the landfill carries a high risk. This data in this exhibit were compiled from injuries occurring at the landfill (to employees of any division, including collection) and from hours of exposure calculated from hours spent at the landfill by all employees (e.g., collection crews emptying packers).

EXHIBIT 21 gives a breakdown by crew size. In this table, the crew size includes the driver, and the rates, as in the other tables, refer to 200,000 man-hours of exposure, i.e., the OSHA recordable injury rate for a 2-man crew is 68 injuries per 200,000 man-hours (approximately 10 man-years) of work on a 2-man crew. Each man on a 2-man crew thus had a 68% chance of being injured per year. The rates for 3-man crew similarly apply to each man. The much higher rates found in the Field Test for 2-man as compared to 3-man crews are surprising,

particularly since the 2-man crews in the Field Test tended to be engaged in private rather than municipal, commercial rather than residential, and curbside rather than backyard collection. The difference may arise because of the particular choice of participants in the Field Test, but is certainly a high priority area for future work.

EXHIBITS 22 and 23 show a breakdown by activity. This refers to the activity being performed by employees on the collection route at the time they were injured. The daily work is broken down into a number of such activities, and detailed estimates were made for each participant in the Field Test of how many man-hours were spent in each activity. For some activities, such as lifting, the number of times the activity was performed (e.g., number of containers lifted) was estimated, and an arbitrary time allocation, constant for all participants, was used to turn the number of lifts into "man-hours" of lifting. EXHIBIT 22 gives percentages, and enables comparisons to be made between the different activities. Lifting, carrying and dumping in hopper are together responsible for over half the OSHA recordable injuries and days lost. Mounting and dismounting (the truck) are responsible for a surprising 8% of injuries and days lost. Pushing waste in hopper is associated with less than 1% of the injuries, but with 5% of the days lost and 7% of the cost, suggesting that special attention be paid to this activity. EXHIBIT 23 gives

rates for the same activities. These rates are useful chiefly for comparing one solid waste agency with another, as discussed in Section IV.

EXHIBIT 24 gives a breakdown by type of equipment. The rates given are for 200,000 hours of use of the equipment. The average rear end loader is associated with about 150 OSHA recordable injuries per 200,000 hours of equipment use. If the average crew size was three, this would correspond to a rate of about 50 injuries per 200,000 man-hours of work with a rear end loader. An average of about $1,080 in direct injury costs per year was associated with the use of each rear end loader in the Field Test. No comparative data for side loaders is available because none of the participants in the Field Test used side loaders.

IV. COMPARISONS BETWEEN INJURY EXPERIENCE OF DIFFERENT PARTICIPANTS

The most striking and significant finding of the Field Test was that there were large differences between participants in the rates for OSHA recordable injuries, for workdays lost and for costs, both overall and for specific aspects of the work environment.

EXHIBIT 25 shows a comparison of OSHA incidence rate (number of OSHA recordable injuries per 200,000 man-hours worked for all employees) for 14 participants during a 12 month period (the 15th participant was a small organization that had no injuries). EXHIBITS 26 and 27 show similar comparisons for ANSI frequency and severity rates. The participant numbers shown are those used in EXHIBIT 1, and the height of each block represents the rate, which is given in numerical form above each block.

The variations from participant to participant can be seen to be very large. Part of this variation can be accounted for by statistical fluctuations expected for participants with only a small number of employees and only a few injuries. The number of OSHA recordable injuries for each participant during a 12 month period was:

Participant #	No. of OSHA Recordable Injuries
01	182
02	32
03	161

Participant #	No. of OSHA Recordable Injuries
04	66
06	254
08	19
09	164
10	30
11	198
13	15
14	1
15	63
16	25
18	5

In the discussion below, only the five largest participants (01, 03, 06, 09, 11) will be compared. These each had more than 150 OSHA recordable injuries and together accounted for approximately 80% of all the OSHA recordable injuries in the Field Test. EXHIBIT 25 shows that, among these five participants, the highest OSHA incidence rate was four times higher than the lowest.

EXHIBIT 28 shows the variation in average direct cost per injury, average direct cost of injuries per employee-year worked, and average number of lost workdays per lost workday case. Participant 11 incurred more than seven times the direct cost per employee-year incurred by Participant 09. This wide range in injury experience suggests that the injury problem has been brought under control to a greater or lesser extent by each participant, and that attempts at increased control by those participants with high injury rates are likely to prove fruitful.

In the following series of comparisons, four parameters are compared for each of the five largest participants and for the average of all participants. The parameters are:

- OSHA recordable injuries per 200,000 man-hours of exposure
- Average number of workdays lost per lost workday case
- Average direct cost per 200,000 man-hours of exposure
- Average direct cost per injury

Because of the effect of a few high-cost injuries, statistical fluctuations produce more variations in the cost parameters than in the number of injuries and total days lost.

EXHIBIT 29 shows the comparison for injuries occurring to workers on the collection route. If the work practices and attention to safety were the same for all participants, the injury rates would also be expected to be the same for all participants. However, the rates for Participants 03 and 11 were much higher than for the rest.

Comparisons may next be made by accident type. EXHIBIT 30 shows a comparison for fall to the same level. In this comparison, Participant 03 is much worse than average, while Participant 11 is about average. For overexertion, EXHIBIT 31, Participant 11 is much worse than average while 03 is average. These comparisons suggest specific areas that should be examined further to explain the overall high collection route injury experience of Participants 03 and 11. Areas for consideration by other participants are shown in EXHIBIT 32, where most of the step on sharp object injuries are experienced by Participants 01 and 06; and by EXHIBIT 33, where

foreign object in eye injuries are much worse than average for Participants 06 and 11.

A different set of comparisons may be made by activity (as discussed in Section 3.4). EXHIBITS 34 and 35 show a comparison for the activities carrying and standing/walking. The much worse than average injury experience for these activities of Participant 03, coupled with the experience for falls to the same level discussed for EXHIBIT 30, suggest that this participant, which performs backyard collection with a non-wheeled intermediate container, should consider a wheeled intermediate container as is used by Participant 09. EXHIBIT 36 shows a comparision for the activity lifting. In this case, Participant 11 is much worse than average, and this, in agreement with the much worse than average rate for overexertion accidents discussed for EXHIBIT 31, suggests that Participant 11 should focus injury reduction efforts in this area.

Some very interesting results of an injury reduction program are shown in EXHIBITS 37 and 38. Participant 09, aware of the significance of injuries occurring while mounting and dismounting from or riding on the "step" on refuse trucks, instituted a program of modifying the steps to provide improved handholds and footing, and of training employees in their use. The result was to reduce the rate for OSHA recordable injuries to far below that of the other major participants.

V. DISCUSSION

Although the Field Test was not directed primarily towards data collection, the results presented in Sections II, III and IV have shown some significant findings related to occupational injuries in the solid waste management industry. The most significant finding is that it is possible, by calculating injury rates associated with various aspects of the work environment, to demonstrate large variations in injury rate and severity between different solid waste management agencies. These differences point out areas in which each solid waste management agency should consider either changes in work practices or increased attention to safety (equipment modifications, employee training, etc.). Measurement of rates also makes it possible for an agency to evaluate the success of safety programs, for example the "step" modifications introduced by Participant 09, and provides a "target" for management to aim at. Each of the participants in the Field Test, even the ones with lowest overall rates, had one or more factors in which their injury rate was higher than some other participant. Even for the participants with low injury rates, there is potential for further reduction.

The limitations of the data should be recognized: only a relatively small number of participants and injuries were included in the Field Test. It is hoped that future data collection, and

improved methods of analysis and presentation, will produce data of increasing value to the solid waste management industry in controlling its serious injury problems.

Participant Number	Municipal=M Private=P	Geographical Area of U.S.	Approximate Average No. of Employees	BY-Backyard CS=Curbside	Task/ 8 hour	TYPE OF SERVICE PROVIDED		Aver. Crew Size	Date of Start-Up
						Collection	Disposal		
01	M	South	700	CS	task	residential	landfill	4-man	10-73
02	M	Northeast	150	CS	8 hour	residential	incinerator/ landfill	3-man	08-73
03	M	Midwest	150	BY	task	residential	landfill	3-man	08-73
04	P	West	250	BY	task	residential/ commercial	transfer station	3-man	01-74
06	M	South	500	CS	task	residential/ commercial	landfill/ incinerator/ transfer station	3-man	10-73
08	M	North	100	BY	task	residential	transfer station	3-man	09-73
09	M	North	600	CS/BY	8 hour	residential	transfer station	3-man	08-73
10	M	West	100	CS	task	residential	landfill	3-man	09-73
11	M	Southwest	300	CS	task	residential	landfill	3-man	09-73
13	P	North	50	CS	task	residential/ commercial	landfill	2-man	01-74
14	M	Northwest	100		8 hour		transfer station/ landfill	1-man	07-73
15	M	South	400	CS	task	residential/ commercial	landfill/ incinerator	3-man	10-73
16	P	South	100	CS	8 hour	commercial	landfill	2-man	09-73
18	M	Northeast	50	CS	task	residential	landfill	3-man	09-73
19	P	North	50	CS	task	residential/ commercial	landfill	2-man	01-74

EXHIBIT 1

Details of Participants in Field Test

EXHIBIT 2

ANALYSIS OF INJURIES BY ACCIDENT TYPE (FIRST ACCIDENT)

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
ACCIDENT TYPE	NO.	%	ACCIDENT TYPE	NO.	%	AV.WDL/LWDC	ACCIDENT TYPE	NO.	%	AV. COST/ INJURY
Overexertion	186	20	Overexertion	1,493	22	10	Overexertion	132 415	23	568
Struck by object	133	14	Fall to same level	1,000	15	12	Struck by vehicle	80 440	14	2,514
Fall to same level	103	11	Struck by object	942	14	11	Fall to different level	67 094	12	627
Fall to different level	86	9	Fall to different level	797	12	12	Caught between	66 656	12	1,666
Hurt by object handled	86	9	Caught between	550	3	26	Fall to same level	57 143	10	397
Struck against vehicle	60	7	Caught in	420	6	47	Struck by object	51 898	9	290
Foreign object in eye	55	6	Struck against vehicle	387	6	8	Caught in	41 354	7	2,954
Struck against object	39	4	Struck by vehicle	377	6	16	Struck against vehicle	25 589	5	278
Stumble	37	4	Stumble	302	5	9	Stumble	18 109	3	329
Caught between	30	3	Hurt by object handled	181	3	5	Hurt by object handled	11 485	2	88
Step on sharp object	28	3	Struck against object	134	2	6	Struck against object	6 127	1	107
Struck by vehicle	27	3	Foreign object in eye	59	<1	2	Foreign object in eye	4 205	<1	47
Animal bite	16	2	Insect bite/sting	21	<1	3	Step on sharp object	1 625	<1	42
Insect bite/sting	14	2	Step on sharp object	18	<1	2	Animal bite	1 408	<1	47
Caught in	10	1	Animal bite	14	<1	3	Insect bite/sting	1 316	<1	51
Dermatitis	6	<1	Dermatitis	9	<1	2	Dermatitis	1 242	<1	177
TOTAL	918	100	TOTAL	6,704	100	11	TOTAL	568 106	100	446

EXHIBIT 3

ANALYSIS OF INJURIES BY INJURY DESCRIPTION

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
INJURY DESCRIPTION	NO.	%	INJURY DESCRIPTION	NO.	%	AV.WDL/LWDC	INJURY DESCRIPTION	NO.	%	AV. COST INJURY
Sprain/strain	350	40	Sprain/strain	3,265	54	11	Sprain/strain	242041	49	545
Cut/laceration/puncture	181	21	Bruise/contusion/crushing	802	13	7	Bruise/contusion/crushing	99789	20	378
Bruise/contusion/crushing	169	20	Fracture	706	12	37	Fracture	55969	11	2,667
Foreign object in eye	69	8	Amputation	641	11	71	Amputation	50597	10	5,662
Fracture	21	2	Cut/laceration/puncture	420	7	5	Cut/laceration/puncture	30547	6	117
Scratches	18	2	Foreign object in eye	116	2	3	Foreign object in eye	7800	2	70
Animal bite	17	2	Inflammation	40	1	13	Scratches	2497	<1	64
Insect bite/sting	14	2	Scratches	29	<1	4	Inflammation	1954	<1	244
Amputation	9	1	Insect bite/sting	21	<1	3	Dermatitis/rash	1501	<1	150
Dermatitis	9	1	Burn from chemical	19	<1	3	Animal bite	1444	<1	47
Inflammation	8	1	Dermatitis/rash	15	<1	2	Insect bite/sting	1316	<1	51
Burn from chemical	7	1	Animal bite	14	<1	3	Burn from chemical	1009	<1	112
TOTAL	865	100	TOTAL	6,091	100	11	TOTAL	496494	100	402

EXHIBIT 4

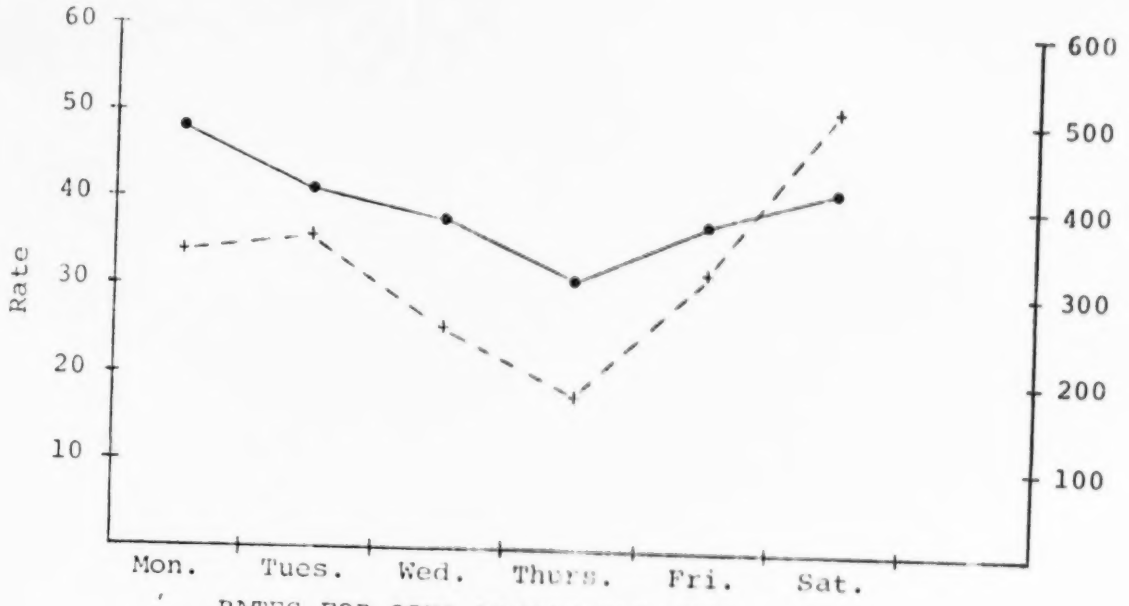
ANALYSIS OF INJURIES BY PART OF BODY

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
PART OF BODY	NO.	%	PART OF BODY	NO.	%	AV.WDL/LWDC	PART OF BODY	NO.	%	AV. COST/ INJURY
Back	56	17	Back	334	21	7.26	Back	18,490	20	260
Eyes	43	13	Fingers	211	13	14.07	Toes	13,853	15	2,308
Knee	32	10	Toes	208	13	104.00	Fingers	9,401	10	277
Leg	26	8	Knee	156	10	8.78	Hand	8,503	9	213
Foot	26	8	Hand	134	8	13.40	Knee	7,970	9	249
Hand	25	8	Eyes	79	5	3.76	Arm	5,163	6	258
Fingers	25	8	Leg	78	5	4.59	Eyes	4,598	5	88
Arm	16	5	Ankle	76	5	5.43	Wrist	4,475	5	298
Ankle	15	5	Wrist	73	5	9.13	Foot	4,411	5	229
Wrist	13	4	Foot	61	4	3.81	Ankle	3,373	4	153
Chest	10	3	Arm	47	3	3.92	Leg	3,093	3	81
Shoulder	7	2	Genitalia	32	2	10.67	Elbow	1,353	1	150
Abdomen	7	2	Shoulder	29	2	4.14	Chest	1,257	1	126
Elbow	6	2	Thumb	28	2	28.00	Thumb	1,248	1	624
Scalp	5	2	Elbow	24	1	4.00	Genitalia	1,203	1	241
Toes	4	1	Chest	20	1	2.86	Shoulder	1,163	1	106
Neck	3	<1	Abdomen	19	1	3.17	Abdomen	722	1	103
Genitalia	2	<1	Neck	6	1	2.00	Neck	474	1	119
Thumb	1	<1	Scalp	2	<1	1.00	Scalp	375	0	62
Skull	1	<1	Jaw	1	<1	1.00	Skull	49	0	16
Jaw	1	<1	Skull	1	<1	1.00	Jaw	45	0	45
Mouth, lip, teeth	1	<1	Brain	0	0	0	Buttocks	45	0	23
Forehead	1	<1	Cheek	0	0	0	Hips	36	0	36
Fingernails	1	<1	Mouth, lip, teeth	0	0	0	Forehead	35	0	35
Hips	1	<1	Forehead	0	0	0	Fingernails	33	0	33
Buttocks	1	<1	Nose	0	0	0	Mouth, lip, teeth	5	0	0
Brain	0	0	Ears	0	0	0	Brain	0	0	0
Cheek	0	0	Fingernails	0	0	0	Cheek	0	0	0
Nose	0	0	Hips	0	0	0	Nose	0	0	0
Ears	0	0	Buttocks	0	0	0	Ears	0	0	0
Toenails	0	0	Toenails	0	0	0	Toenails	0	0	0
TOTAL	330	100	TOTAL	1,620	100	9.59	TOTAL	91,373	100	154

EXHIBIT 5

ANALYSIS OF INJURIES BY DAY OF WEEK

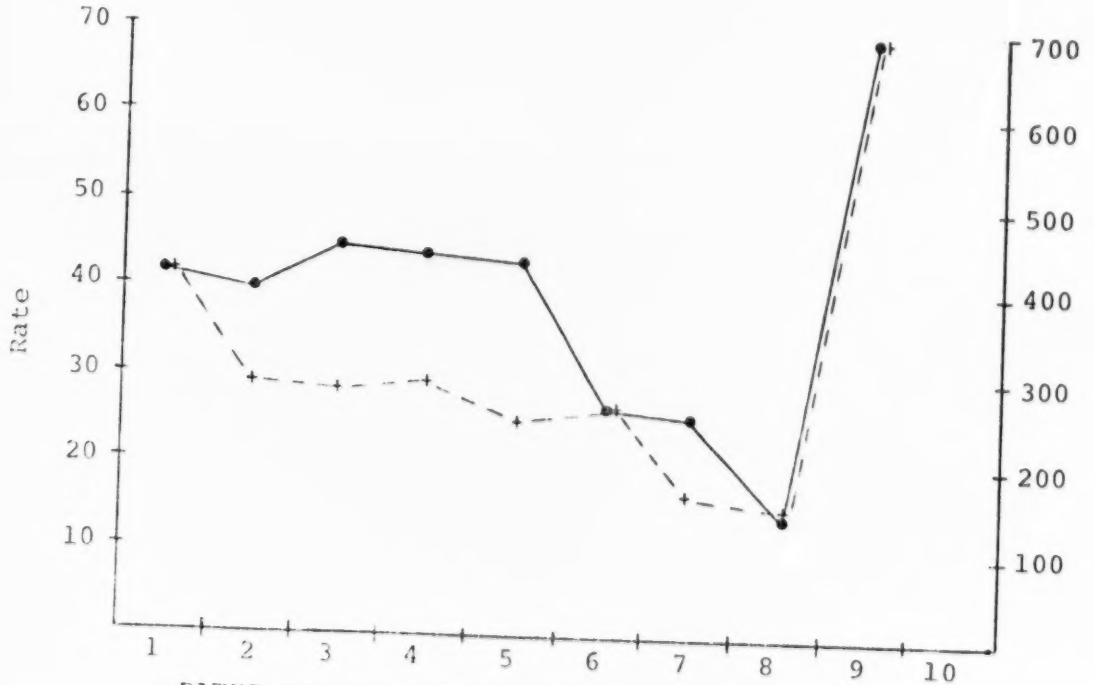
OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
DAY OF WEEK	NO.	RATE	DAY OF WEEK	NO.	RATE	AV.WDL/LWDC	DAY OF WEEK	NO.	RATE	AV. COST/INJURY
Monday	236	48	Saturday	344	516	20.23	Saturday	22620	322	339
Saturday	28	42	Tuesday	1,739	356	12.88	Wednesday	128252	290	595
Tuesday	202	41	Monday	1,701	346	10.37	Tuesday	142514	274	522
Wednesday	158	38	Friday	1,513	318	14.27	Friday	134914	269	566
Friday	178	37	Wednesday	1,058	253	9.53	Monday	106452	205	521
Thursday	148	31	Thursday	827	174	7.31	Thursday	51139	102	224
Sunday	6	19	Sunday	14	45	7.00	Sunday	2376	73	396
Unknown	6	-	Unknown	59	-	7.80	Unknown	2320	0	387
TOTAL	962	39	TOTAL	7,235	296	11.07	TOTAL	590595	228	440



RATES FOR OSHA RECORDABLE INJURIES AND WORKDAYS LOST AS A FUNCTION OF DAY OF THE WEEK

EXHIBIT 6

● = OSHA Recordable
+ = Workdays Lost



RATES FOR OSHA RECORDABLE INJURIES AND WORKDAYS LOST AS A FUNCTION OF HOURS ON JOB PRIOR TO INJURY

EXHIBIT 7

● = OSHA Recordable
+ = Workdays Lost

EXHIBIT 8

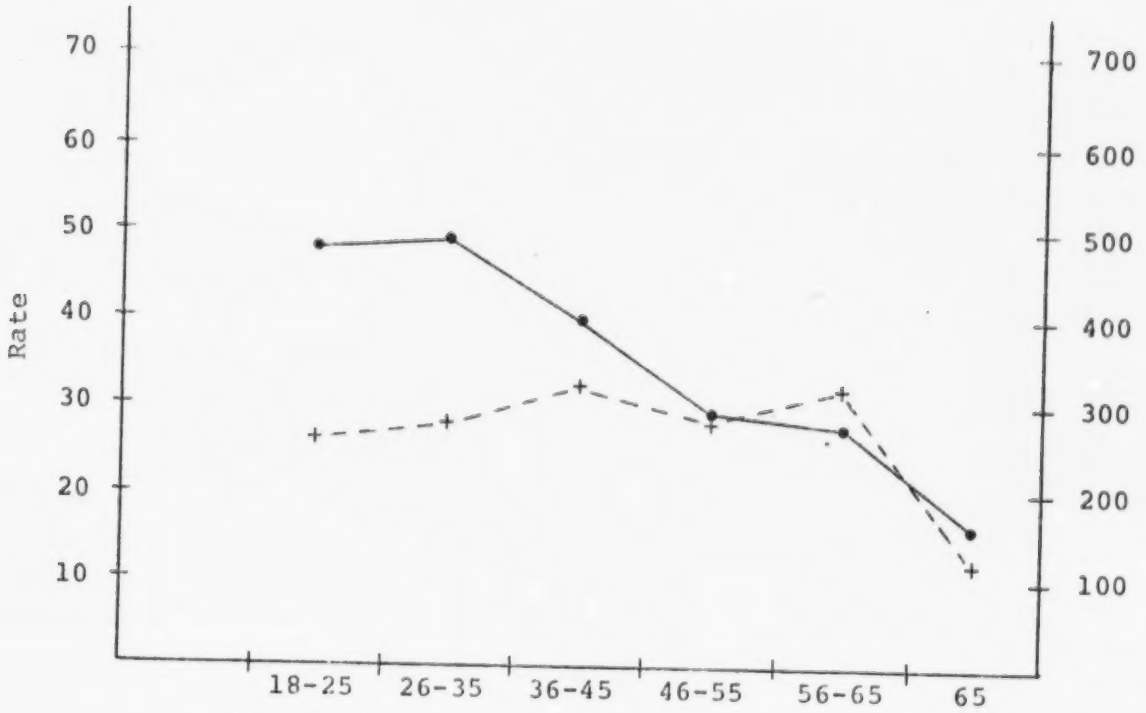
ANALYSIS OF INJURIES BY HOURS ON JOB PRIOR TO INJURY

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
HOURS ON JOB PRIOR TO INJURY	NO.	RATE	HOURS ON JOB PRIOR TO INJURY	NO.	RATE	AV.WDL/LWDC	HOURS ON JOB PRIOR TO INJURY	NO.	RATE	AV. COST/ INJURY
Other	29	369	Other	136	1111	7.55	Other	7778	6222	194
9 hours	14	69	9 hours	128	693	12.80	9 hours	7100	331	374
10 hours	4	52	10 hours	35	458	8.75	1 hour	111972	297	541
3 hours	160	45	1 hour	1,501	422	13.28	2 hours	97783	264	504
4 hours	147	44	4 hours	961	292	9.70	4 hours	85143	243	460
5 hours	88	43	2 hours	1,018	290	10.14	6 hours	85319	227	632
1 hour	153	43	3 hours	1,011	283	8.94	10 hours	1653	207	276
2 hours	140	40	6 hours	935	262	10.38	5 hours	42485	198	360
6 hours	93	26	5 hours	507	249	14.38	3 hours	62427	166	275
7 hours	72	25	7 hours	466	165	10.73	7 hours	44695	150	382
8 hours	26	14	8 hours	274	149	13.70	8 hours	22641	117	492
Unknown	35	0	Unknown	251	0	13.21	Unknown	19542	0	434
TOTAL	961	39	TOTAL	7,223	295	11.07	TOTAL	588538	228	440

EXHIBIT 9

ANALYSIS OF INJURIES BY EMPLOYEE AGE AT TIME OF INJURY

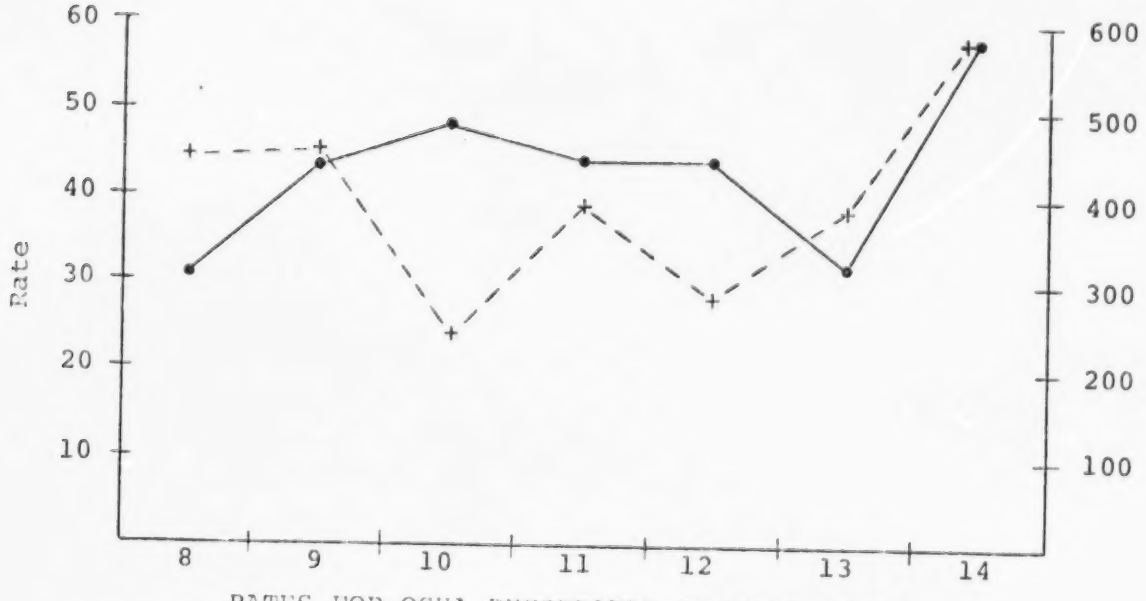
OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
AGE	NO.	RATE	AGE	NO.	RATE	AV.WDL/LWDC	AGE	NO.	RATE	AV. COST INJURY
Under 18 years	8	75	Under 18 years	64	601	10.66	36-45	140056	245	465
26-35	287	48	36-45	1,715	317	12.16	26-35	150107	240	404
18-25	153	47	56-65	1,023	315	17.33	18-25	77230	224	371
36-45	213	39	46-55	1,652	279	12.90	Under 18 years	2295	205	230
46-55	177	30	26-35	1,609	271	7.69	46-55	103929	166	398
56-65	89	27	18-25	825	256	9.06	56-65	38662	113	284
Over 65	9	16	Over 65	66	115	13.20	Over 65	5137	85	514
TOTAL	936	38	TOTAL	6,954	285	10.88	TOTAL	517424	200	399



RATES FOR OSHA RECORDABLE INJURIES AND WORKDAYS LOST AS A FUNCTION OF AGE

• = OSHA Recordable
+ = Workdays Lost

EXHIBIT 10



RATES FOR OSHA RECORDABLE INJURIES AND WORKDAYS LOST AS A FUNCTION OF EDUCATION (GRADE)

EXHIBIT 11

• = OSHA Recordable
+ = Workdays Lost

EXHIBIT 12

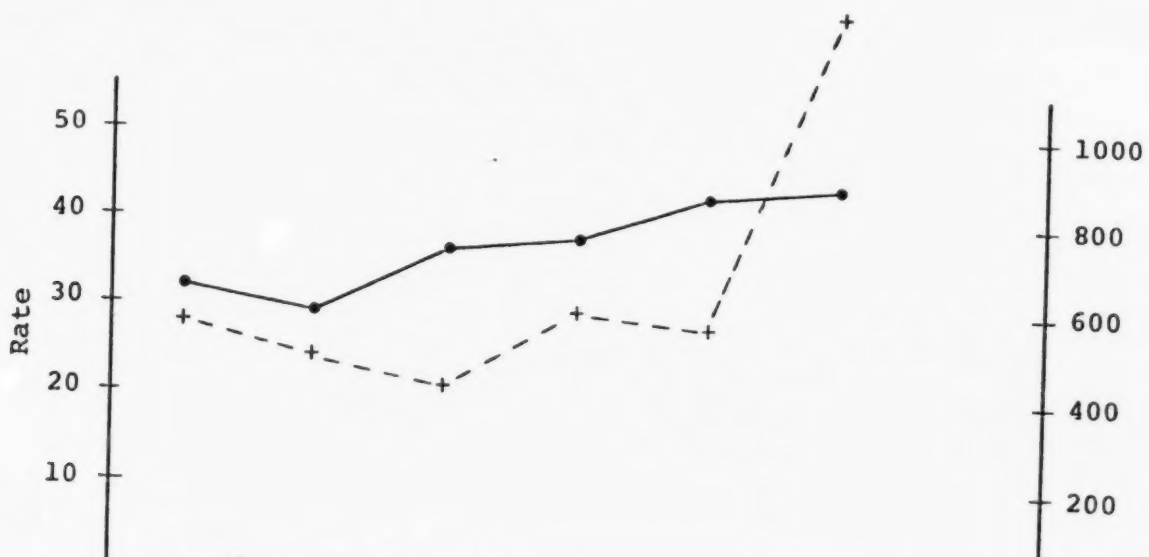
ANALYSIS OF INJURIES BY EMPLOYEE EDUCATIONAL LEVEL (LAST GRADE COMPLETED)

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
EDUCATION	NO.	RATE	EDUCATION	NO.	RATE	AV.WDL/LWDC	EDUCATION	NO.	RATE	AV. COST INJURY
Second year college	19	57	Second year college	191	574	15	First year college	28926	720	1,315
Fourth grade	8	52	Eighth grade	698	442	20	Eleventh grade	82801	373	679
Second grade	4	51	Eleventh grade	616	392	12	Second year college	12664	361	452
Third grade	8	50	First year college	147	386	18	Twelfth grade	140811	253	474
Fourth year college	5	50	Third grade	58	366	12	Eighth grade	34705	208	529
Tenth grade	101	47	Fourth grade	53	346	13	Tenth grade	45087	199	358
First grade	2	47	Ninth grade	448	322	11	Fourth grade	3168	196	352
Eleventh grade	92	44	Twelfth grade	1,426	271	9	Ninth grade	28524	195	305
Twelfth grade	230	44	No answer	2,456	258	12	Third grade	2559	153	320
Ninth grade	60	43	Tenth grade	512	239	8	No answer	129048	128	263
Sixth grade	13	41	Sixth grade	64	201	6	Fifth grade	3842	115	427
No answer	313	33	Fifth grade	38	120	5	Sixth grade	2469	73	176
First year college	12	32	Second grade	8	102	3	Second grade	524	64	105
Eighth grade	48	31	Third year college	8	82	4	Seventh grade	1556	38	111
Seventh grade	11	28	Seventh grade	30	76	4	Third year college	369	36	74
Fifth year college	1	23	First grade	1	23	1	First grade	146	32	73
Fifth grade	7	22	Fourth year college	0	0	0	Fifth year college	7	17	77
Third year college	2	21	Fifth year college	0	0	0	Fourth year college	146	14	21
Sixth year college	0	0	Sixth year college	0	0	0	Sixth year college	0	0	0
Seventh year college	0	0	Seventh year college	0	0	0	Seventh year college	0	0	0
Eighth year college	0	0	Eighth year college	0	0	0	Eighth year college	0	0	0
TOTAL	936	38	TOTAL	2,456	258	12	TOTAL	517424	200	399

EXHIBIT 13

ANALYSIS OF INJURIES BY EMPLOYEE HEIGHT

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
HEIGHT	NO.	RATE	HEIGHT	NO.	RATE	AV.WDL/LWDC	HEIGHT	NO.	RATE	AV. COST/INJURY
6ft. 9 in. - 6 ft. 11 in.	2	155	7 ft. and over	30	820	15	6 ft. 3 in. - 6 ft. 5 in.	57254	792	1,507
7 ft and over	2	55	6 ft. 3 in. - 6 ft. 5 in.	461	673	19	5 ft. - 5 ft. 2 in.	9991	339	999
6 ft. 3 in. - 6 ft. 5 in.	30	44	6 ft. 6 in. - 6 ft. 8 in.	20	520	20	6 ft. 9 in. - 6 ft. 11 in.	420	315	210
6 ft. - 6 ft. 2 in.	187	43	5 ft. 9 in. - 5 ft. 11 in.	2380	302	11	5 ft. 9 in. - 5 ft. 11 in.	195382	234	471
5 ft. 9 in. - 5 ft. 11 in.	304	38	5 ft. - 5 ft. 2 in.	82	293	21	6 ft. - 6 ft. 2 in.	88930	195	333
5 ft. 6 in. - 5 ft. 8 in.	202	37	No answer	1223	292	12	6 ft. 6 in. - 6 ft. 8 in.	781	195	390
No answer	154	37	6 ft. - 6 ft. 2 in.	1222	286	10	5 ft. 6 in. - 5 ft. 8 in.	88145	152	321
5 ft. - 5 ft. 2 in.	9	32	5 ft. 3 in. - 5 ft. 5 in.	371	244	12	No answer	58111	131	269
5 ft. 3 in. - 5 ft. 5 in.	45	30	5 ft. 6 in. - 5 ft. 8 in.	1164	212	8	5 ft. 3 in. - 5 ft. 5 in.	18112	113	255
6 ft. 6 in. - 6 ft. 8 in.	1	26	6 ft. 9 in. - 6 ft. 11 in.	1	78	1	7 ft. and over	298	80	149
4 ft. 9 in. - 4 ft. 11 in.	0	0	4 ft. 9 in. - 4 ft. 11 in.	0	0	0	5 ft. 9 in. - 4 ft. 11 in.	0	0	0
4 ft. 6 in. - 4 ft. 8 in.	0	0	4 ft. 6 in. - 4 ft. 8 in.	0	0	0	4 ft. 6 in. - 4 ft. 8 in.	0	0	0
4 ft. 3 in. - 4 ft. 5 in.	0	0	4 ft. 3 in. - 4 ft. 5 in.	0	0	0	4 ft. 3 in. - 4 ft. 5 in.	0	0	0
4 ft. - 4 ft. 2 in.	0	0	4 ft. - 4 ft. 2 in.	0	0	0	4 ft. - 4 ft. 2 in.	0	0	0
Under 4 ft.	0	0	Under 4 ft.	0	0	0	Under 4 ft.	0	0	0
TOTAL	936	38	TOTAL	6954	285	11	TOTAL	517424	200	399



RATES FOR OSHA RECORDABLE INJURIES AND WORKDAYS LOST AS A FUNCTION OF HEIGHT

• = OSHA Recordable
+ = Workdays Lost

EXHIBIT 14

RATES FOR OSHA RECORDABLE INJURIES AND WORKDAYS LOST AS A FUNCTION OF WEIGHT

• = OSHA Recordable
+ = Workdays Lost

EXHIBIT 15

EXHIBIT 16

ANALYSIS OF INJURIES BY EMPLOYEE WEIGHT

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
WEIGHT	NO.	RATE	WEIGHT	NO.	RATE	AV.WDL/LWDC	WEIGHT	NO.	RATE	AV. COST INJURY
280-289 lbs.	4	74	260-269 lbs.	34	479	11	230-239 lbs.	15924	387	1,225
300 and over	2	63	150-159	1,063	392	15	150-159	104026	364	765
170-179	141	48	180-189	982	378	13	170-179	85357	275	423
200-209	55	46	190-199	632	348	13	200-209	33572	267	473
260-260	3	42	300 and over	11	347	11	180-189	68682	248	.516
160-169	126	41	170-179	967	329	9	190-199	38914	203	414
140-149	79	39	No answer	1,257	290	12	260-269	1498	202	499
150-159	104	38	200-209	311	261	9	160-169	61307	190	348
190-199	68	37	160-169	778	254	9	250-259	2331	186	595
180-189	98	37	210-219	181	230	15	No answer	60076	132	271
No answer	159	37	220-229	123	230	8	300 and over	437	131	219
220-229	19	35	250-259	24	197	8	210-219	10199	123	291
210-219	25	32	280-289	10	185	3	220-229	6011	106	194
130-139	29	29	130-139	181	180	9	140-149	19536	91	183
240-249	6	26	230-239	69	177	14	130-139	8110	76	169
230-239	10	26	140-149	200	151	6	280-289	423	75	71
250-259	3	25	240-249	25	107	6	240-249	466	19	58
120-129	4	11	120-129	7	19	7	120-129	473	12	95
110-119	1	8	100-109	0	0	0	110-119	32	3	32
100-109	0	0	110-119	0	0	0	100-109	0	0	0
270-279	0	0	270-279	0	0	0	270-279	0	0	0
290-299	0	0	290-299	0	0	0	290-299	0	0	0
TOTAL	936	38	TOTAL	6,954	285	11	TOTAL	517424	200	399

EXHIBIT 17

ANALYSIS OF INJURIES BY BASIS OF EMPLOYMENT

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
BASIS OF EMPLOYMENT	NO.	RATE	BASIS OF EMPLOYMENT	NO.	RATE	AV.WDL/LWDC	BASIS OF EMPLOYMENT	NO.	RATE	AV. COST INJURY
Student	4	153	Regular	6,715	290	11	Regular	501087	205	418
Temporary	44	68	Unknown	65	212	11	Unknown	5694	135	196
Unknown	21	52	Temporary	119	183	4	Temporary	8881	130	164
Seasonal	5	41	Seasonal	35	286	9	Seasonal	1563	122	156
Regular	862	37	Student	0	0	0	Student	186	68	47
"Pep"	0	0	"Pep"	0	0	0	"Pep"	13	2	13
TOTAL	936	38	TOTAL	6,954	285	11	TOTAL	517424	200	399

EXHIBIT 18

ANALYSIS OF INJURIES BY OCCUPATIONAL GROUP

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
OCCUPATIONAL GROUP	NO.	RATE	OCCUPATIONAL GROUP	NO.	RATE	AV.WDL/LWDC	OCCUPATIONAL GROUP	NO.	RATE	AV. COST/INJURY
Collection Crews	694	50	Collection crews	5,339	381	11	Administrative	4769	314	4,769
Miscellaneous	1	42	Administrative	33	229	33	Collection crews	406725	275	407
Laborers/utilitymen	144	27	Laborers/utilitymen	1,060	201	14	Laborers/utilitymen	72556	130	465
Foreman/supervisors	45	24	Heavy equipment operators	250	148	12	Heavy equipment operators	14724	83	327
Equipment maintenance	9	23	Foreman/supervisors	219	115	7	Foreman/supervisors	15503	77	250
Heavy equipment operators	34	20	Equipment maintenance	35	91	6	Equipment maintenance	1989	49	124
Ancillary	5	12	Miscellaneous	2	84	2	Miscellaneous	70	28	70
Administrative	1	7	Ancillary	16	40	5	Ancillary	991	23	110
Office	2	5	Office	0	0	0	Sales/service/cust.	87	4	29
Sales/service/cust.	1	5	Sales/service/cust.	0	0	0	Office	0	0	0
Unknown	0	0	Unknown	0	0	0	Unknown	0	0	0
TOTAL	936	38	TOTAL	6,954	284	11	TOTAL	517424	200	399

EXHIBIT 19

ANALYSIS OF INJURIES BY DIVISION OF EMPLOYMENT

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
DIVISION	NO.	RATE	DIVISION	NO.	RATE	AV.WDL/LWDC	DIVISION	NO.	RATE	AV. COST/INJURY
Collection	715	47	Collection	5,420	358	11	Collection	413211	259	400
Utility & ancillary	32	29	Multiple/other/unknown	1,276	206	15	Multiple/other/unknown	84584	129	483
Multiple/other/unknown	159	25	Utility & ancillary	158	142	6	Utility & ancillary	10688	91	267
Construction	4	24	Maintenance shop	37	78	5	Office & administration	4769	80	795
Maintenance shop	11	23	Office & administration	33	58	33	Maintenance shop	2109	42	100
Landfill	7	15	Construction	7	42	2	Landfill	1369	28	152
Incinerator	1	15	Streets	9	32	3	Construction	337	19	84
Streets	4	14	Landfill	14	31	7	Streets	291	10	36
Office & administration	3	5	Incinerator	0	0	0	Incinerator	66	9	66
TOTAL	936	38	TOTAL	6,954	284	11	TOTAL	517424	200	399

EXHIBIT 20

ANALYSIS OF INJURIES BY LOCATION OF INJURY

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
LOCATION	NO.	RATE	LOCATION	NO.	RATE	AV.NDL/LWDC	LOCATION	NO.	RATE	AV. COST/ INJURY
Collection route	697	55	Collection route	5,443	533	11	Landfill & dump	111793	628	1,242
Landfill & dump	65	39	Landfill & dump	451	267	11	Collection route	391608	294	402
Incinerator	8	16	Transfer station	38	82	19	Transfer station	3090	63	615
Transfer station	5	11	Office & hard	206	72	11	Office & yard	13775	35	230
Office & yard	39	11	Incinerator	14	31	4	Incinerator	964	20	88
Unknown	148	0	Unknown	1,022	0	11	Unknown	69365	0	342
TOTAL	962	39	TOTAL	7,235	296	11	TOTAL	590595	228	440

EXHIBIT 21

ANALYSIS OF INJURIES BY CREW SIZE

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
COLLECTION CREW SIZE	NO.	RATE	COLLECTION CREW SIZE	NO.	RATE	AV.WDL/LWDC	COLLECTION CREW SIZE	NO.	RATE	AV. COST/INJURY
2 man crew	179	68	2 man crew	1,596	612	12	2 man crew	97107	351	408
3 man crew	364	36	3 man crew	2,962	295	12	3 man crew	209292	198	412
5 man crew	8	21	4 man crew	535	151	11	4 man crew	31992	127	592
4 man crew	47	20	5 man crew	39	102	8	5 man crew	2469	61	190
1 man crew	7	8	1 man crew	7	0	2	1 man crew	458	5	38
6 man crew	0	0	6 man crew	0	0	0	6 man crew	0	0	0
7 man crew	0	0	7 man crew	0	0	0	7 man crew	0	0	0
8 man crew	0	0	8 man crew	0	0	0	8 man crew	0	0	0
Other size crew	0	0	Other size crew	0	0	0	Other size crew	0	0	0
Unknown	92	0	Unknown	488	0	8	Unknown	50290	0	342
TOTAL	697	42	TOTAL	5,445	328	11	TOTAL	391608	223	402

EXHIBIT 22

ANALYSIS OF INJURIES BY ACTIVITY BEING PERFORMED
AT TIME OF INJURY (WITH PERCENTAGES)

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
ACTIVITY	NO.	%	ACTIVITY	NO.	%	AV.WDL/LWDC	ACTIVITY	NO.	%	AV. COST INJURY
Lifting	164	24	Lifting	1,185	23	10.67	Lifting	66436	18	299
Carrying	117	17	Carrying	724	15	8.43	Dumping in hopper	53855	14	359
Dumping in hopper	106	16	Dumping in hopper	699	14	10.75	Carrying	42841	11	280
Standing/walking	60	9	Standing/walking	490	10	11.13	Riding	40180	11	758
Mounting/dismounting	53	8	Riding	405	8	11.91	Driving	35845	9	2,560
Pushing/pulling	43	6	Mounting/dismounting	404	8	8.59	Standing/walking	35382	9	372
Riding	42	6	Operating machine/equipment	315	6	21.00	Mounting/dismounting	28116	7	396
Dumping in other	26	4	Pushing/pulling	265	5	6.13	Push waste in hopper	26531	7	4,422
Throwing/catching	18	3	Push waste in hopper	263	5	87.66	Pushing/pulling	21640	6	318
Operating machine/equipment	18	3	Driving	152	3	25.33	Operating machine/equipment	13026	3	521
Driving	8	1	Dumping in other	75	1	4.16	Throwing/catching	5895	2	236
Push waste in container	6	<1	Throwing/catching	39	<1	4.33	Dumping in other	3744	<1	121
Push waste in hopper	5	<1	Push waste in container	33	<1	16.50	Push waste in container	2028	<1	203
Attaching/detaching	4	<1	Guiding/directing	32	<1	10.66	Guiding/directing	1839	<1	307
Guiding/directing	4	<1	Clean/wash/clearing	5	<1	5.00	Using hand tools	326	<1	82
Using hand tools	2	<1	Using hand tools	4	<1	2.00	Clean/wash/clearing	251	<1	251
Climbing	1	<1	Attaching/detaching	4	<1	1.00	Attaching/detaching	199	<1	50
Clean/wash/clearing	1	<1	Climbing	3	<1	3.00	Climbing	127	<1	127
TOTAL	678	100	TOTAL	5,115	100	11.05	TOTAL	378270	100	399

EXHIBIT 23

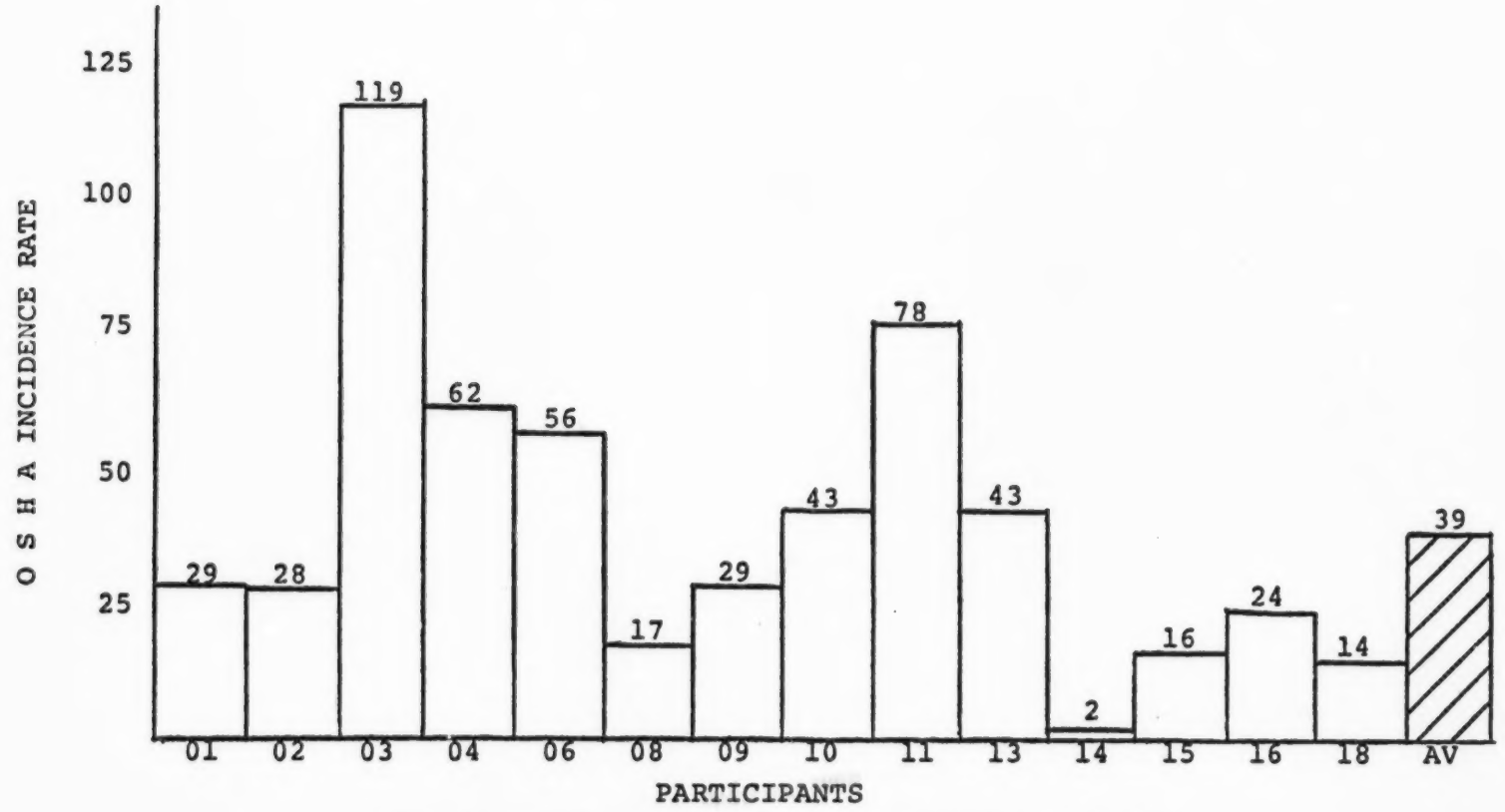
ANALYSIS OF INJURIES BY ACTIVITY BEING PERFORMED
AT TIME OF INJURY (WITH RATES)

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
ACTIVITY	NO.	RATE	ACTIVITY	NO.	RATE	AV.WDL/LWDC	ACTIVITY	NO.	RATE	AV. COST/ INJURY
Lifting	164	248	Push waste in hopper	263	3,483	87.66	Push waste in hopper	26531	3,351	4,422
Throwing/catching	18	220	Lifting	1,185	1,795	10.67	Mounting/dismounting	28115	984	396
Dumping in hopper	106	203	Mounting/dismounting	404	1,489	8.59	Dumping in hopper	53855	976	359
Mounting/dismounting	53	195	Dumping in hopper	699	1,336	10.75	Lifting	66436	955	299
Dumping in other	26	142	Operating machine/equipment	315	957	21.00	Throwing/catching	5895	687	236
Pushing/pulling	43	87	Throwing/catching	39	598	4.33	Pushing/pulling	21640	415	318
Clean/wash/clearing	1	70	Pushing/pulling	265	537	9.13	Dumping in other	3744	378	121
Carrying	117	67	Guiding/directing	32	520	10.66	Operating machine/equipment	13026	376	521
Push waste in hopper	5	66	Carrying	742	427	8.43	Guiding/directing	1839	287	307
Guiding/directing		65	Dumping in other	75	409	4.16	Carrying	42841	232	280
Operating machine/equipment	18	55	Clean/wash/clearing	5	348	5.00	Riding	40189	195	758
Attaching/detaching	4	31	Riding	405	207	11.91	Clean/wash/clearing	251	167	251
Using hand tools	2	26	Standing/walking	490	165	11.13	Driving	35845	153	2,560
Riding	42	21	Push waste in container	33	104	16.50	Standing/walking	35382	113	372
Standing/walking	60	20	Driving	152	68	25.33	Push waste in container	2028	60	203
Push waste in container	6	19	Using hand tools	4	53	2.00	Using hand tools	326	41	82
Climbing	1	7	Attaching/detaching	4	31	1.00	Attaching/detaching	199	15	50
Driving	8	4	Climbing	3	22	3.00	Climbing	127	9	127
TOTAL	678	55	TOTAL	5,115	417	11.05	TOTAL	378270	292	399

EXHIBIT 24

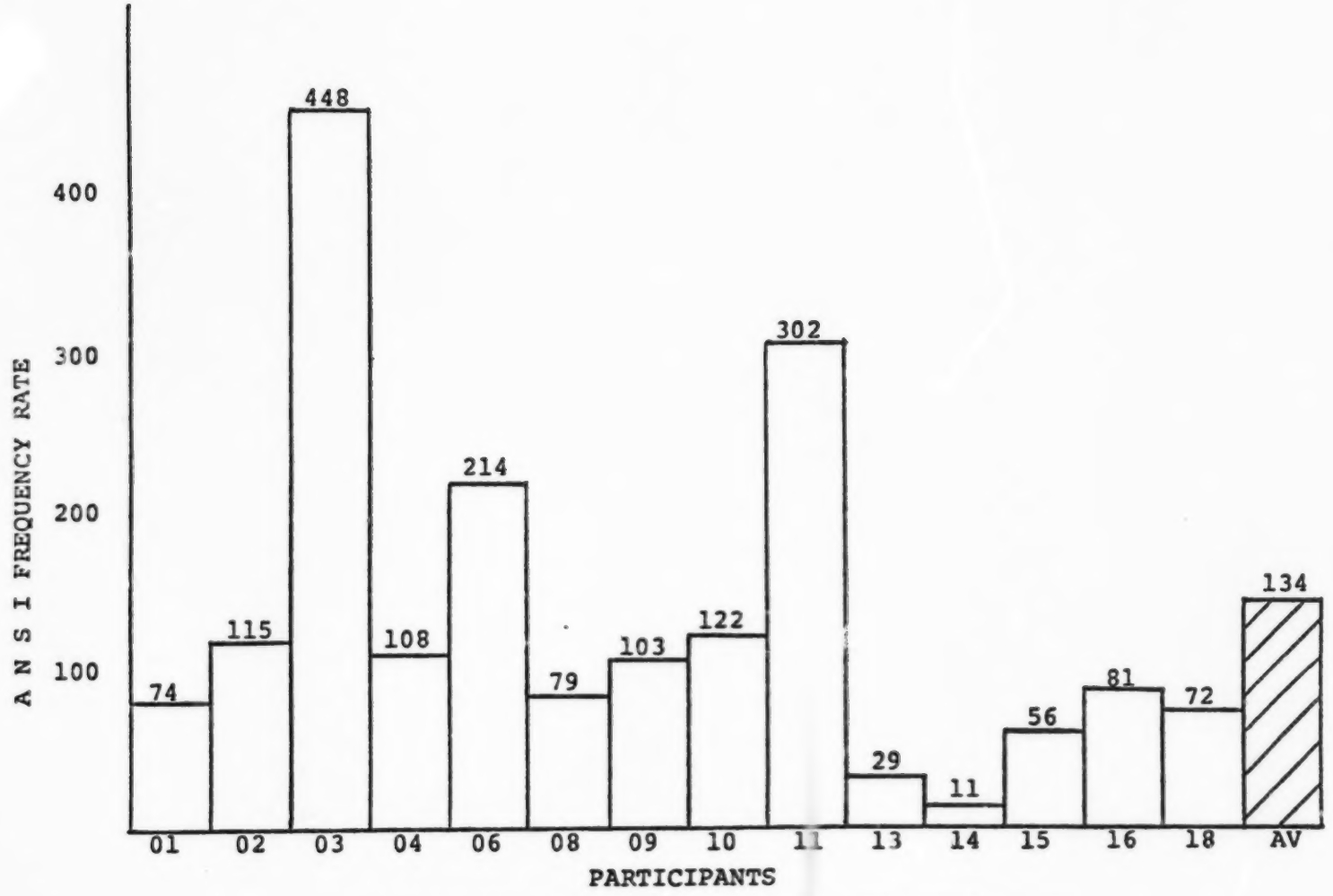
ANALYSIS OF INJURIES BY TYPE OF EQUIPMENT

OSHA RECORDABLE INJURIES			WORKDAYS LOST				DIRECT COSTS			
TYPE OF EQUIPMENT	NO.	RATE	TYPE OF EQUIPMENT	NO.	RATE	AV.WDL/LWDC	TYPE OF EQUIPMENT	NO.	RATE	AV. COST INJURY
Rear end loader	512	150	Rear end loader	4,399	1293	11.55	Rear end loader	390078	1030	534
Open body dump	126	84	St. const. equip.	226	228	14.13	Open body dump	55735	356	334
Other	26	83	Open body dump	800	526	11.59	St. const. equip.	8439	293	325
Load lugger	2	62	Other	139	444	7.72	Other	9428	285	277
St. const. equip.	23	54	Roll-off	14	185	14.00	Landfill equipment	3825	83	201
Landfill equipment	14	31	Pickup	64	140	10.67	Pickup	3702	73	180
Pickup	13	28	Load lugger	3	93	1.50	Roll-off	579	73	193
Front end loader	12	23	Front end loader	43	81	4.78	Front end loader	2237	40	132
Roll-off	1	13	Landfill equipment	33	75	6.60	Load lugger	93	27	47
St. clean equip.	1	2	St. clean equip.	0	0	0	St. clean equip.	64	1	64
Automobile	0	0	Automobile	0	0	0	Automobile	0	0	0
TOTAL	730	93	TOTAL	5,712	731	11.29	TOTAL	474260	575	464



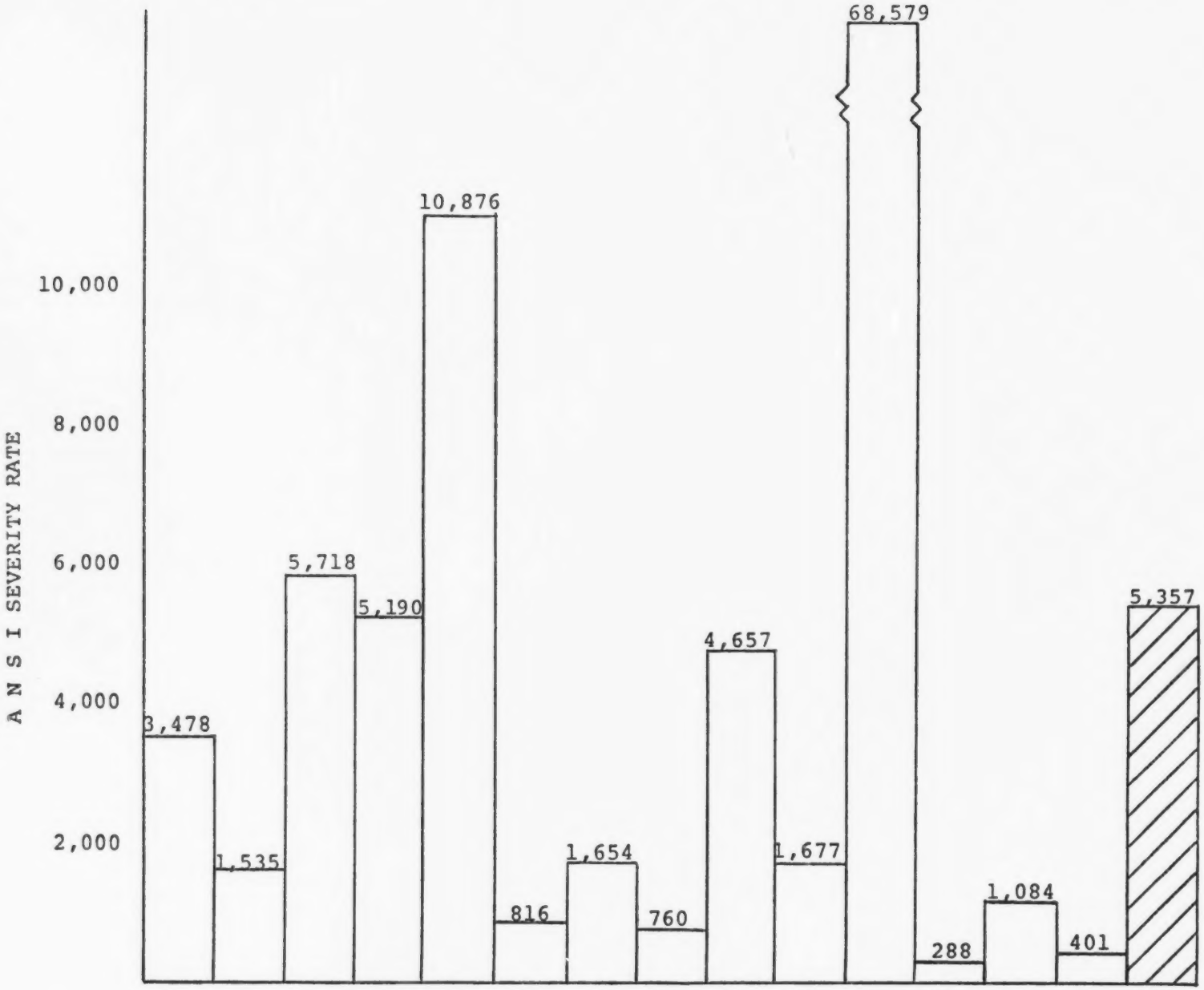
OSHA INCIDENCE RATES FOR TOTAL RECORDABLE CASES

EXHIBIT 25

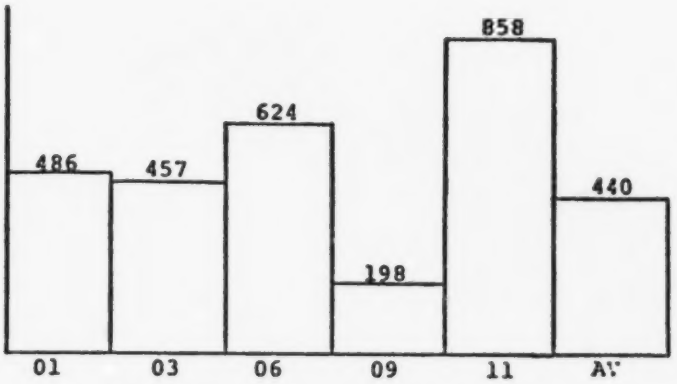


COMPARISON OF ANSI FREQUENCY RATES BY PARTICIPANT

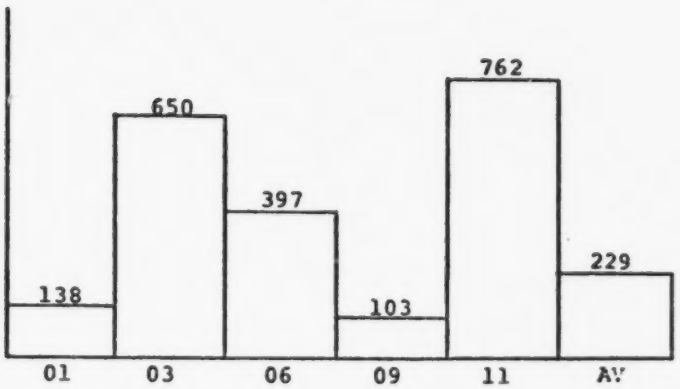
EXHIBIT 26



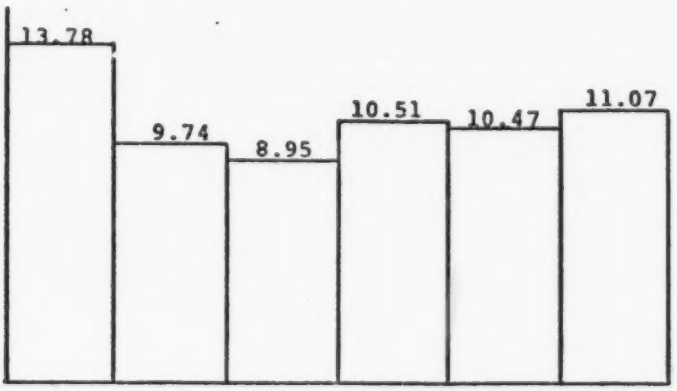
COMPARISON OF ANSI SEVERITY RATES BY PARTICIPANT
EXHIBIT 27



AVERAGE DIRECT COST PER INJURY



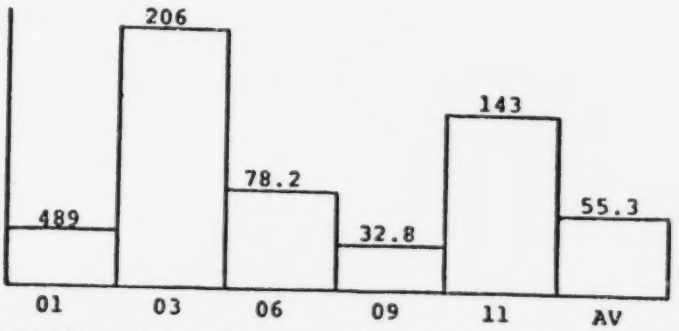
AVERAGE DIRECT COST OF INJURIES PER EMPLOYEE-YEAR WORKED



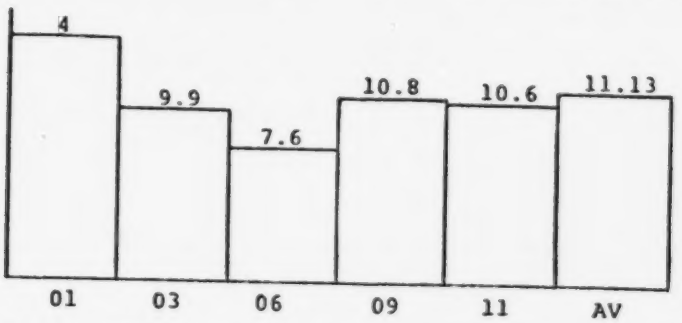
AVERAGE NO. OF LOST WORKDAYS PER LOST WORKDAY CASE

EXHIBIT 28

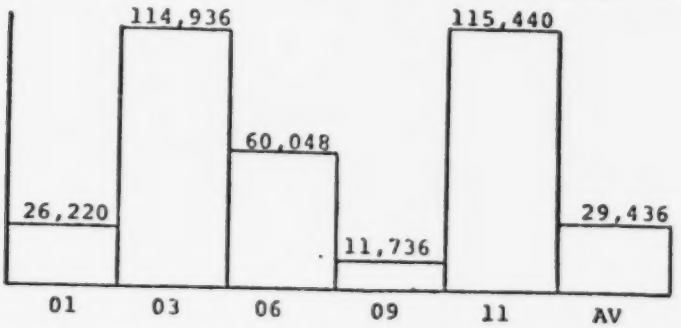
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS
AND AVERAGE OF ALL PARTICIPANTS
FOR ALL INJURIES



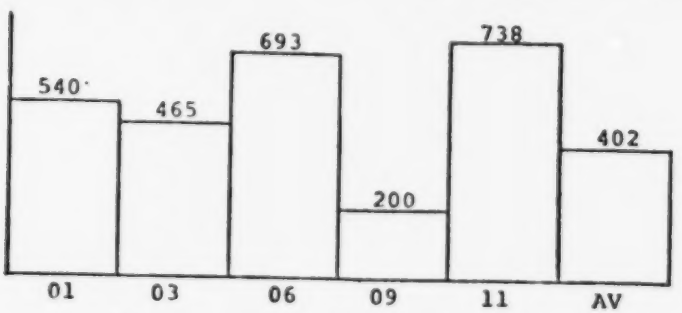
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE



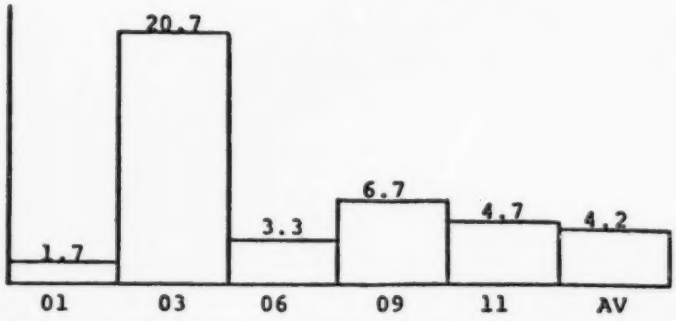
AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE



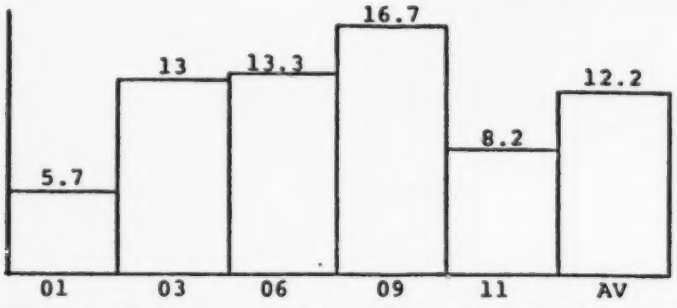
AVERAGE DIRECT COST PER INJURY

EXHIBIT 29

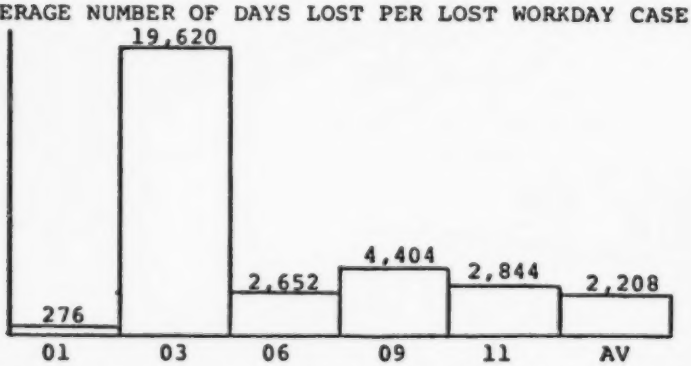
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS (01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS FOR LOCATION - COLLECTION ROUTE



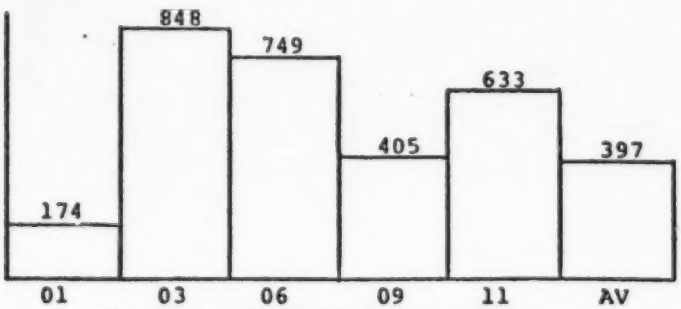
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE



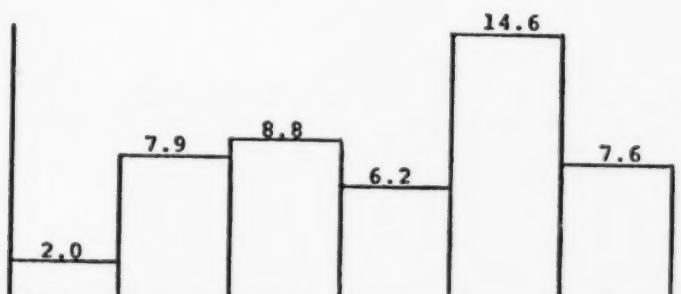
AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE



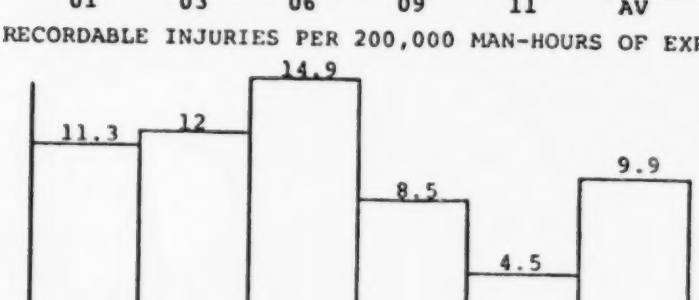
AVERAGE DIRECT COST PER INJURY

EXHIBIT 30

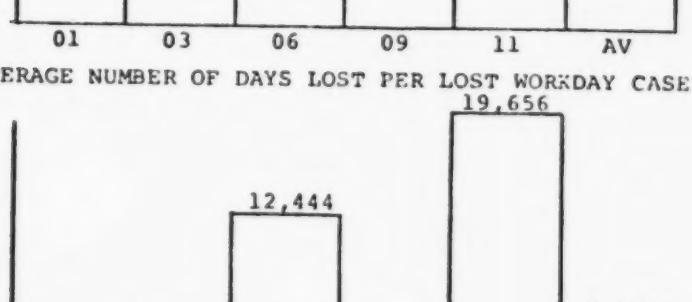
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS (01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS FOR ACCIDENT TYPE - FALL TO SAME LEVEL



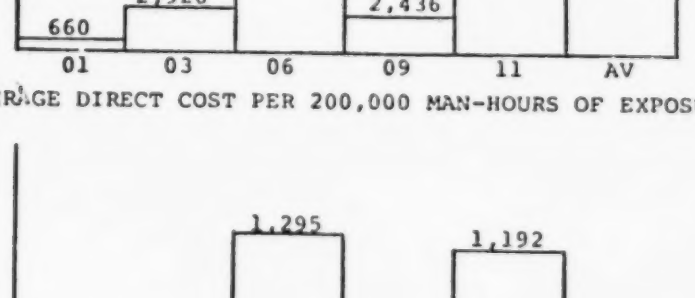
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE



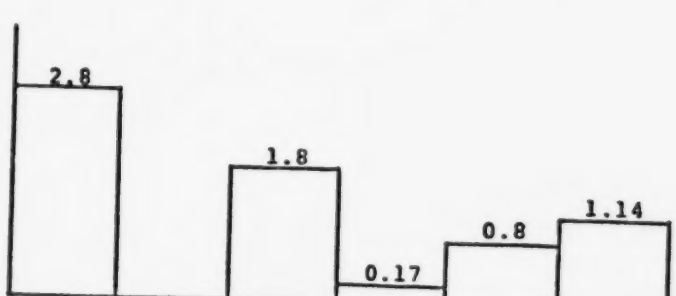
AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE



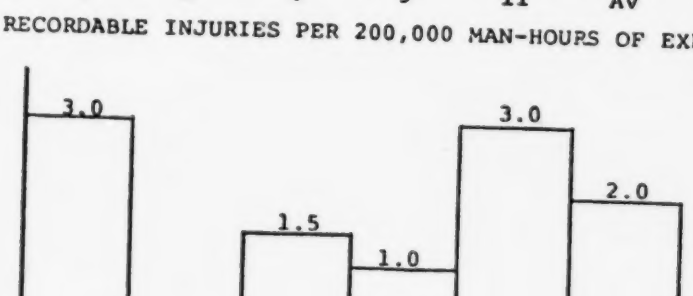
AVERAGE DIRECT COST PER INJURY

EXHIBIT 31

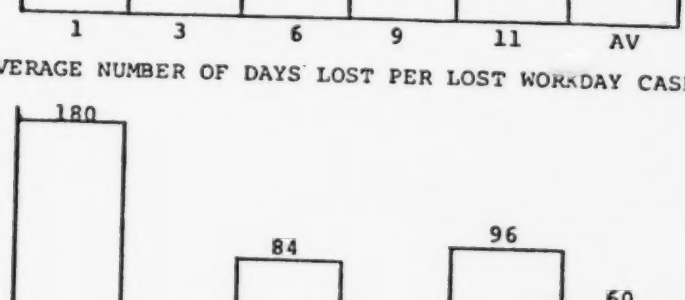
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS (01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS FOR ACCIDENT TYPE - OVEREXERTION



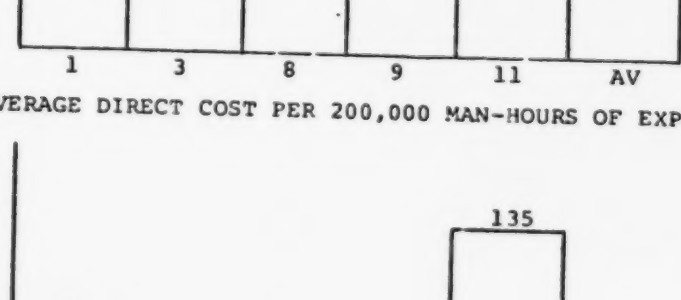
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE

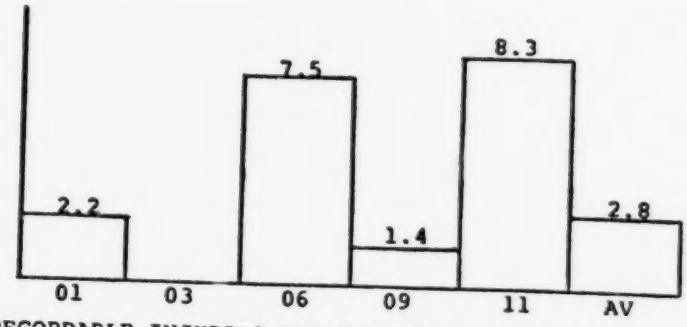


AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE

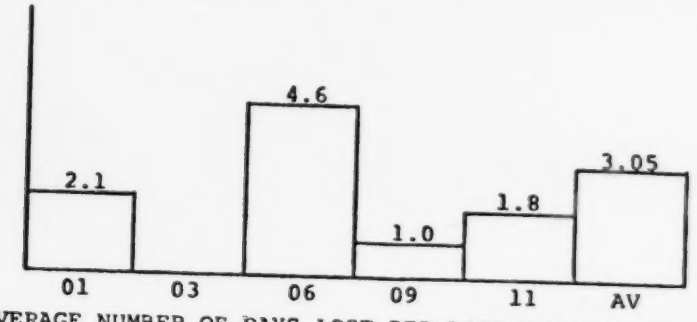


AVERAGE DIRECT COST PER INJURY

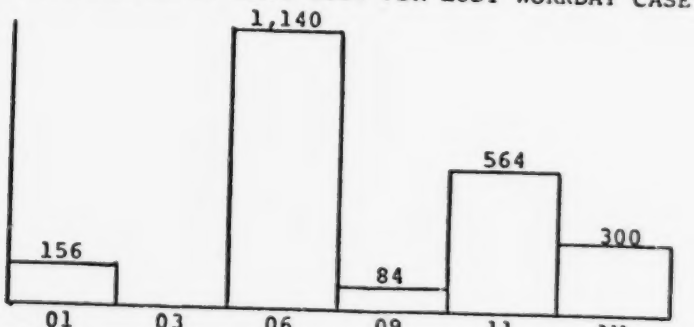
EXHIBIT 32
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS
(01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS
FOR ACCIDENT TYPE - STEP ON SHARP OBJECT



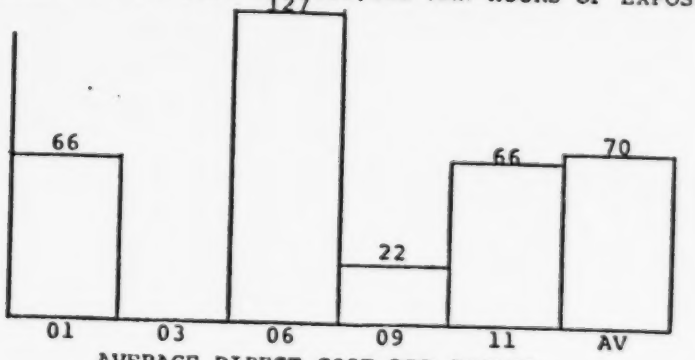
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE



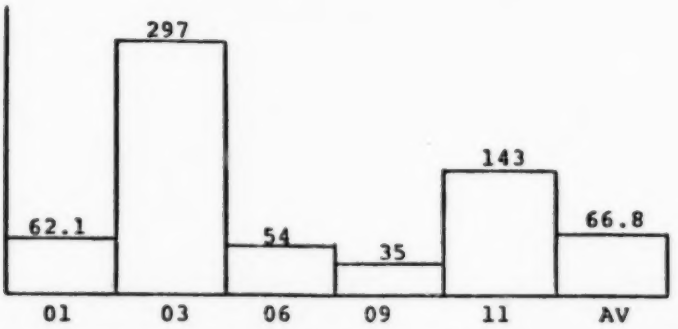
AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE



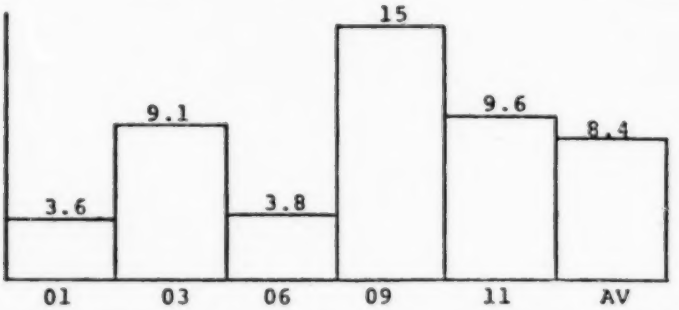
AVERAGE DIRECT COST PER INJURY

EXHIBIT 33

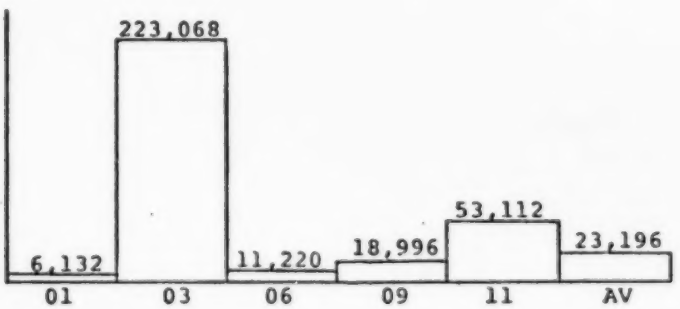
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS (01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS FOR INJURY TYPE - FOREIGN OBJECT IN EYE



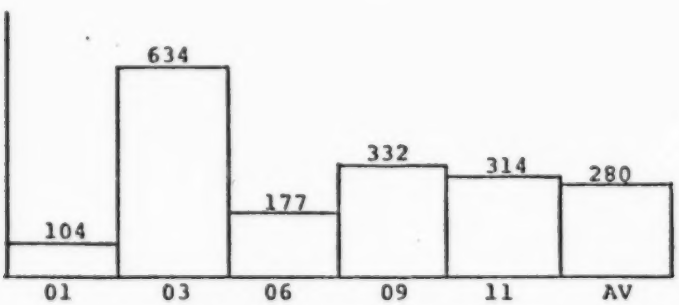
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE

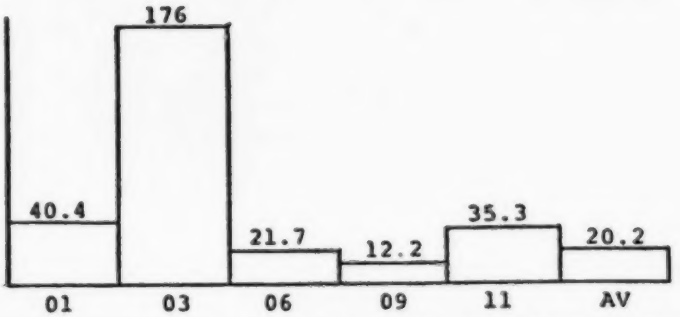


AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE

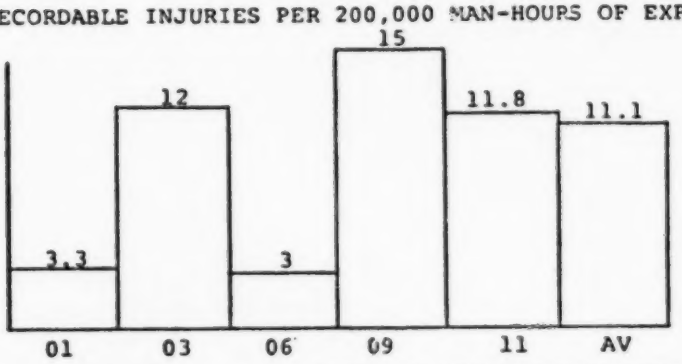


AVERAGE DIRECT COST PER INJURY

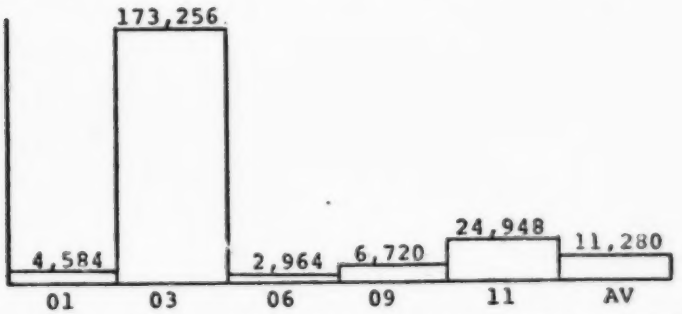
EXHIBIT 34
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS
(01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS
FOR ACTIVITY - CARRYING



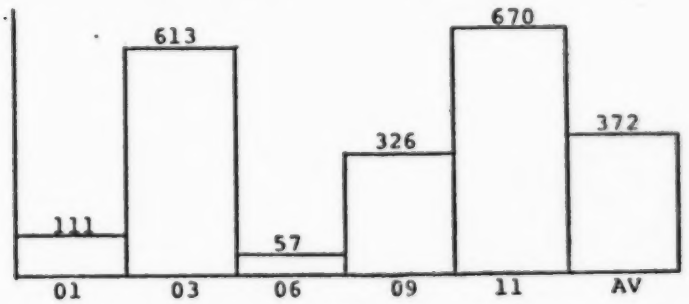
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE

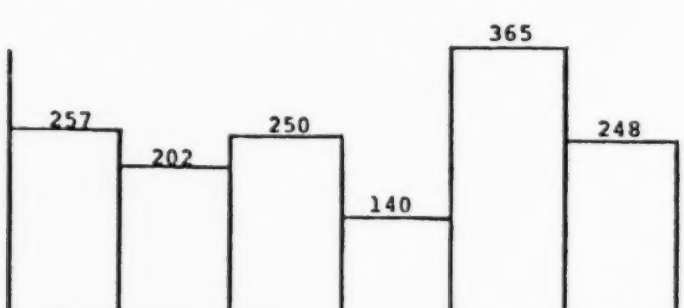


AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE

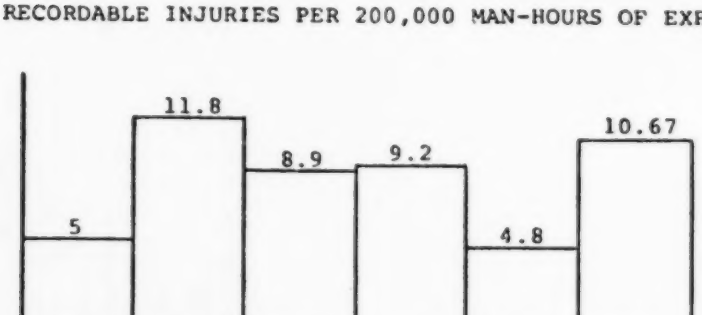


AVERAGE DIRECT COST PER INJURY

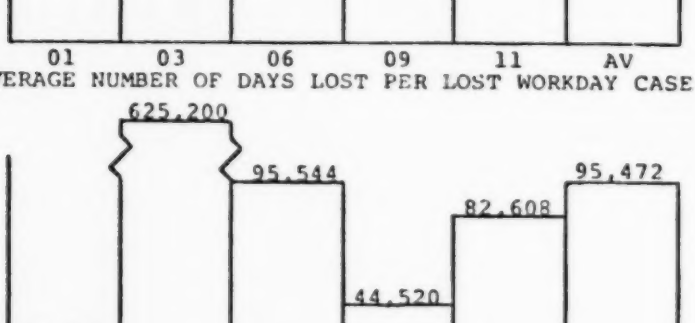
EXHIBIT 35
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS
(01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS
FOR ACTIVITY - STANDING/WALKING



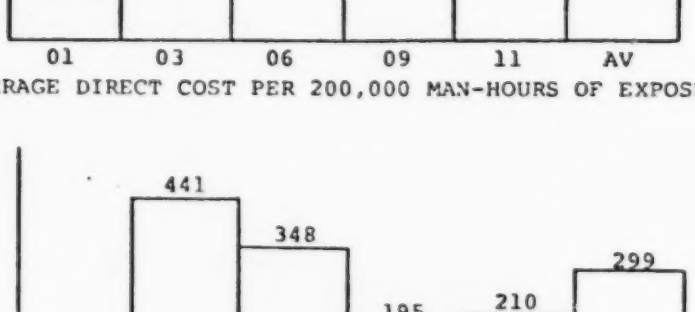
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE

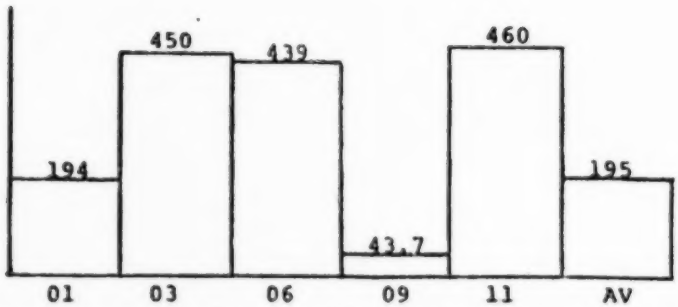


AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE

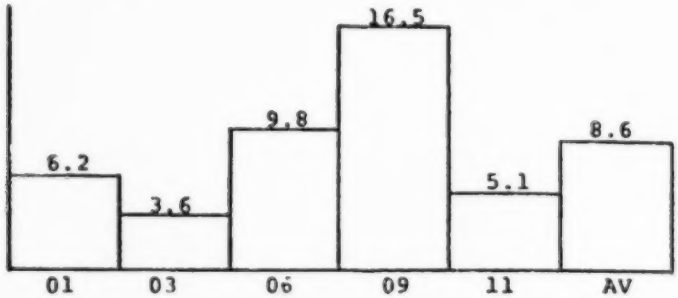


AVERAGE DIRECT COST PER INJURY

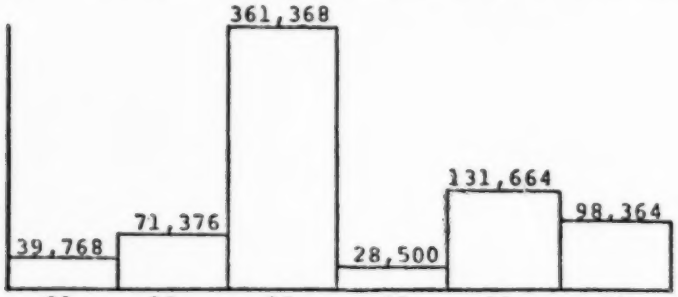
EXHIBIT 36
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS
(01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS
FOR ACTIVITY - LIFTING



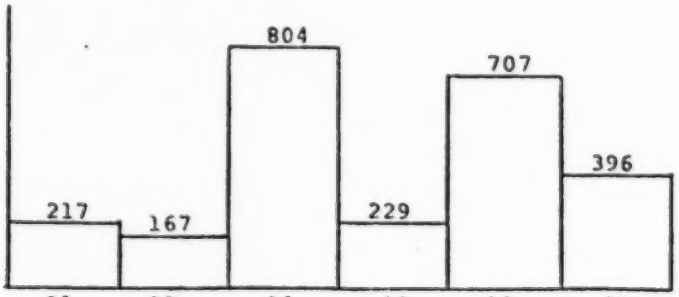
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE

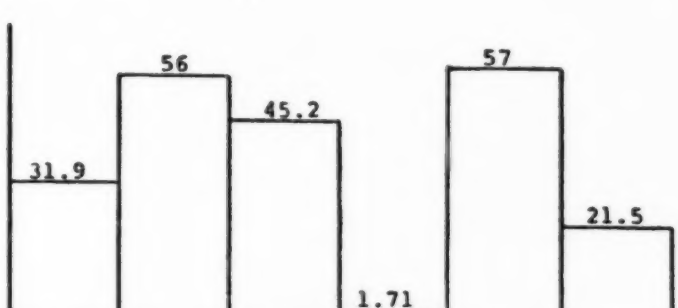


AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE

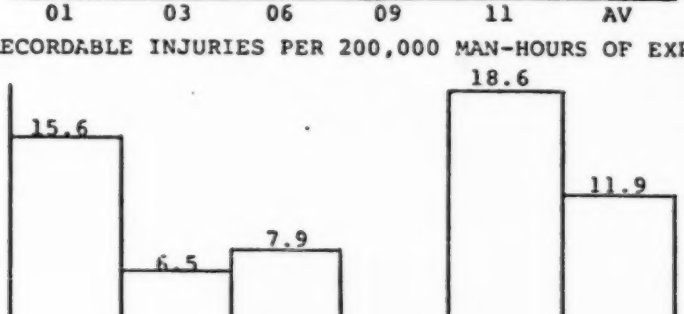


AVERAGE DIRECT COST PER INJURY

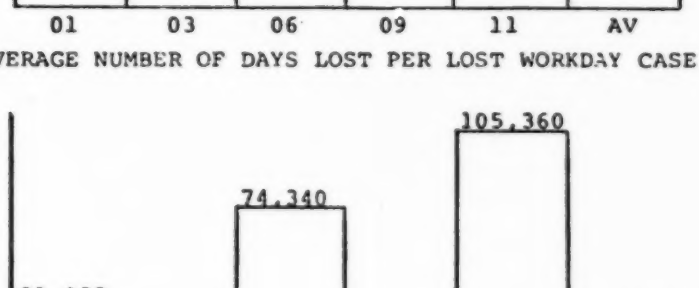
EXHIBIT 37
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS
(01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS
FOR ACTIVITY - MOUNTING/DISMOUNTING



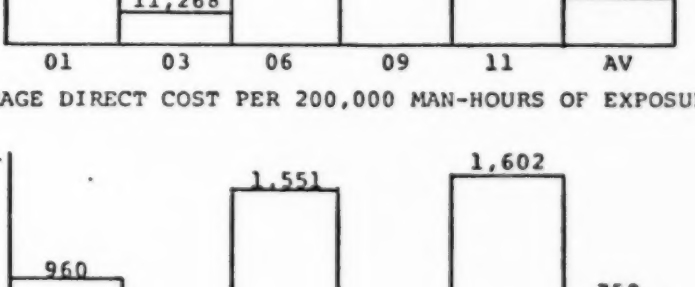
OSHA RECORDABLE INJURIES PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE NUMBER OF DAYS LOST PER LOST WORKDAY CASE



AVERAGE DIRECT COST PER 200,000 MAN-HOURS OF EXPOSURE



AVERAGE DIRECT COST PER INJURY

EXHIBIT 38
COMPARISON BETWEEN EACH OF 5 MAJOR PARTICIPANTS
(01, 03, 06, 09, 11) AND AVERAGE (AV) OF ALL PARTICIPANTS
FOR ACTIVITY - RIDING

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